CISCO SYSTEMS

Cisco uBR10012 Universal Broadband Router Hardware Installation Guide

INCLUDING LICENSE AND WARRANTY

1 Cisco One-Year Limited Hardware Warranty Terms

There are special terms applicable to your hardware warranty and various services that you can use during the warranty period. Your formal Warranty Statement, including the warranties and license agreements applicable to Cisco software, is available on Cisco.com. Follow these steps to access and download the *Cisco Information Packet* and your warranty and license agreements from Cisco.com.

1. Launch your browser, and go to this URL:

   http://www.cisco.com/univercd/cc/td/doc/es_inpck/cetrans.htm

   The Warranties and License Agreements page appears.

2. To read the *Cisco Information Packet*, follow these steps:

   a. Click the **Information Packet Number** field, and make sure that the part number 78-5235-03A0 is highlighted.

   b. Select the language in which you would like to read the document.

   c. Click **Go**.

   The Cisco Limited Warranty and Software License page from the Information Packet appears.

   d. Read the document online, or click the **PDF** icon to download and print the document in Adobe Portable Document Format (PDF).

   Note   You must have Adobe Acrobat Reader to view and print PDF files. You can download the reader from Adobe's website: http://www.adobe.com

3. To read translated and localized warranty information about your product, follow these steps:

   a. Enter this part number in the Warranty Document Number field:

   78-10747-01C0

   b. Select the language in which you would like to view the document.

   c. Click **Go**.

   The Cisco warranty page appears.

   d. Read the document online, or click the **PDF** icon to download and print the document in Adobe Portable Document Format (PDF).

You can also contact the Cisco service and support website for assistance:

http://www.cisco.com/public/Support_root.shtml.

Duration of Hardware Warranty

One (1) Year

Replacement, Repair, or Refund Policy for Hardware

Cisco or its service center will use commercially reasonable efforts to ship a replacement part within ten (10) working days after receipt of a Return Materials Authorization (RMA) request. Actual delivery times can vary, depending on the customer location.

Cisco reserves the right to refund the purchase price as its exclusive warranty remedy.

To Receive a Return Materials Authorization (RMA) Number

Contact the company from whom you purchased the product. If you purchased the product directly from Cisco, contact your Cisco Sales and Service Representative.

Complete the information below, and keep it for reference.

Company product purchased from	
Company telephone number	
Product model number	
Product serial number	
Maintenance contract number	

2 Overview

The Cisco uBR10012 universal broadband router is an aggregation platform that provides a high-end, high-performance, high-capacity Cable Modem Termination System (CMTS) solution. The system provides high-speed data, broadband entertainment, and IP telephony services over a coaxial cable connection to residential and commercial subscribers using cable modems or digital set-top boxes (STBs). The router enables high-speed data services to be packaged like they are in basic cable television service or video programming.

Figure 1   Cisco uBR10012 Universal Broadband Router
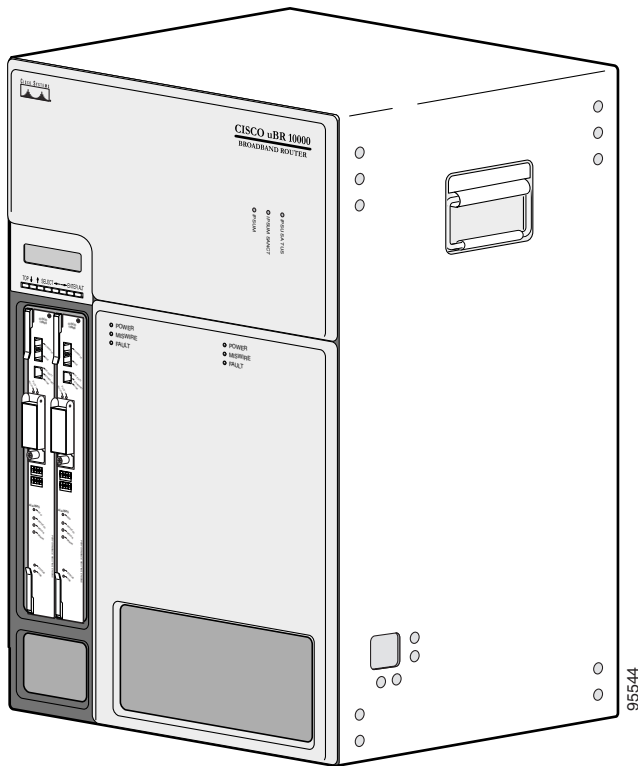
The Cisco uBR10012 universal broadband router:

- Operates with cable modems or STBs that support the DOCSIS 1.0, DOCSIS 1.0+, and DOCSIS 1.1 versions of the DOCSIS specification, and supports the 6 MHz North American channel plans using the ITU J.83 Annex B RF standard.

- Supports downstream digitally modulated signals in the 70 to 860-MHz frequency range.

- Supports upstream channel digitally modulated signals in the 5 to 65-MHz frequency range

- Supports multiple standards and multiple interfaces and allows operators to choose the appropriate services and devices for their CMTS platform.

- Supports data and digitized voice connectivity over a bidirectional cable television and IP backbone network.

- Uses the same Parallel Express Forwarding (PXF) technology used by the Cisco ESR10000 edge services router.

⚠

Warning   Only trained and qualified personnel should be allowed to install, replace, or service this equipment.
Statement 1030

For translations of the warnings used in this document, see the Cisco Regulatory Compliance and Safety Information document that comes with this chassis. Reference the translations by statement number (ex: Statement 1030).
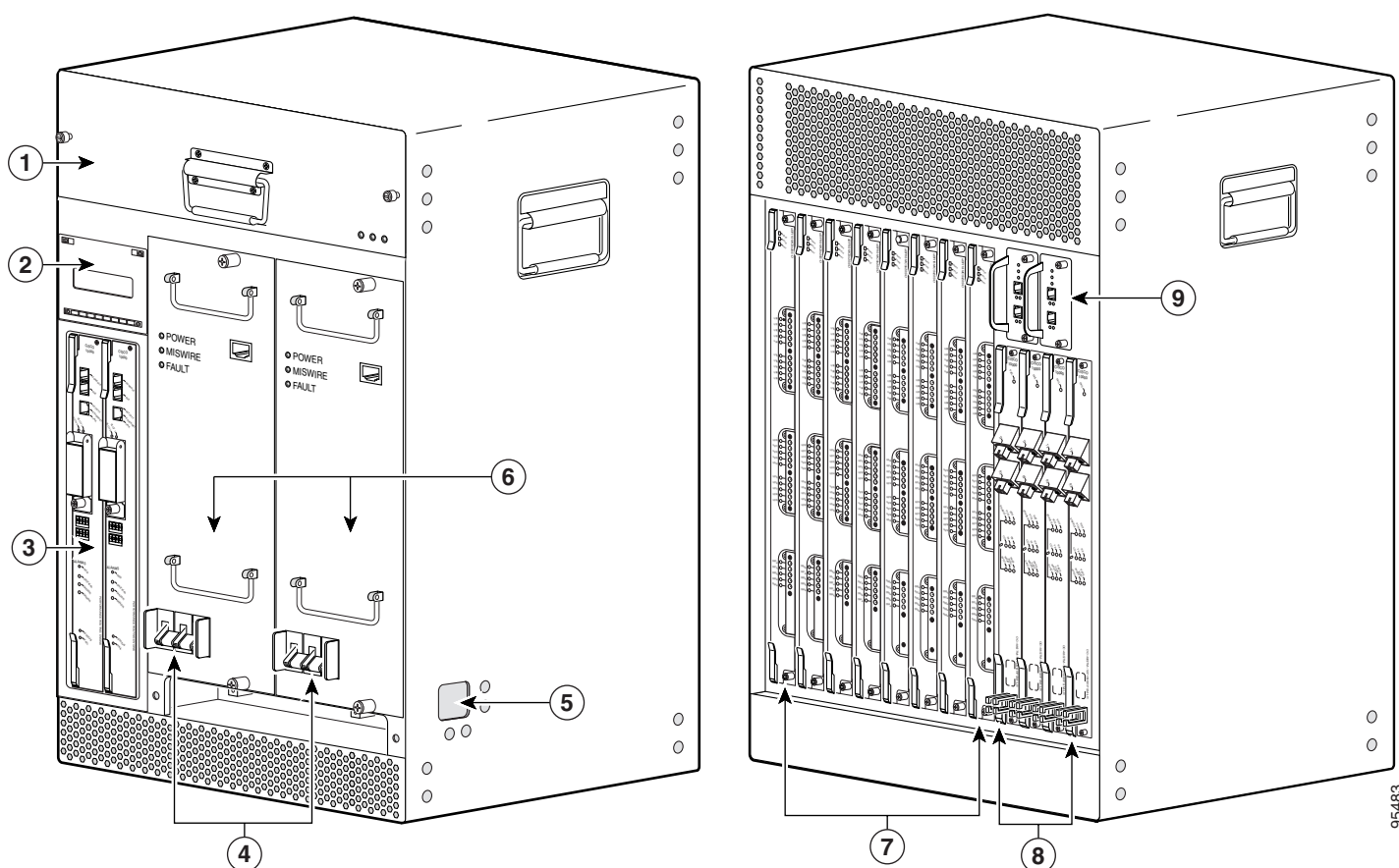
Cisco uBR10012 Universal Broadband Router Components

The Cisco uBR10012 chassis is designed for front and rear access. The two AC or DC PEMs, the two PRE1s, the LCD panel, and the fan assembly module are accessed from the front of the chassis. The eight slots for cable interface line cards, four full-slots for network uplink line cards, and two slots for the TCC+ cards are accessed from the rear of the chassis.

✎
Note The Cisco uBR10012 router uses an auxiliary 2400-W AC-input power shelf for situations in which 100–120 VAC is the only available power source. The AC-input power shelf converts AC to DC for the router. For more information about the power shelf, refer to *2400 W AC-Input Power Shelf for the Cisco uBR10012 Universal Broadband Router* at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ubr10012/frus/ub10acsh.htm

Figure 2   Front and Rear Chassis Views

1	Fan assembly	6	DC Power Entry Modules (DC PEMs)
2	LCD module	7	Cable interface line cards
3	Performance Routing Engine (PRE) processor modules	8	High-speed, high-performance network uplink line cards
4	Ground lugs	9	Timing, Communication, and Control Plus (TCC+) cards
5	DC power cable and ground cable exit		

3 Site Preparation

Do not unpack the system until you are ready to install it. Keep the chassis in the shipping container to prevent accidental damage until you determine an installation site.

Before you install the Cisco uBR10012 universal broadband router, review the following:

- The environmental conditions your installation site must meet to maintain normal operation.
- The power requirements that must be in place at your installation sites.
- The cabling requirements for your installation sites.
- Rack-mounting requirements.
- The equipment required to install the router.

Site Environment Guidelines

Warning **This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.** Statement 1017

Warning **This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations.** Statement 1045

Check the following:

- The site is capable of maintaining an ambient temperature of 41 through 104°F (5 through 40°C).
- Do not place the chassis where heated exhaust air from other systems can enter the air intake vent at the bottom front, because this can cause overheating of the system.
- Maintain a minimum clearance of 3 in. (7.62 cm) from the vents on the front and back of the chassis to allow for adequate airflow.
- Allow for approximately 3 to 4 ft (91.44 to 121.92 cm) clearance at the front and rear of the chassis for cabling and normal system maintenance.

Temperature and Humidity Requirements

Table 1 lists the nominal operating and nonoperating environments requirements. Any measurement that approaches the minimum or maximum of a range indicates a potential problem.

Table 1   *Specifications for Operating and Nonoperating Environments*

Specification	Minimum	Maximum
Temperature, ambient operating	41°F (5°C)	104°F (40°C)
Temperature, ambient nonoperating and storage	–40°F (–40°C)	158°F (70°C)
Humidity, ambient (nonconducting) operating	5%	85%
Humidity, ambient (noncondensing) nonoperating and storage	5%	95%
Altitude, operating and nonoperating	–197 ft (–60 m)	13,123 ft (4000 m)
Vibration, operating	—	5 to 200 Hz, 0.5 g (1 octet/min.)
Vibration, nonoperating	—	5 to 200 Hz, 1 g (1 octet/min.) 200 to 500 Hz, 2 g (1 octet/min.)

Power Guidelines

Follow these precautions and recommendations when planning power connections to the Cisco uBR10012 router:

- Check the power at your site before installation and periodically after installation to ensure that you are receiving clean power. Install a power conditioner if necessary.
- Provide proper grounding.
- Make sure that frame ground is tied to a single building ground.
- Use a 6-AWG, copper ground conductor (minimum requirement) when attaching the chassis ground to a central office or other interior ground system.

⚠️

Caution The Cisco uBR10012 router installation must comply with all applicable codes and is approved for use with copper conductors only. The ground bond fastening hardware should be of compatible material and preclude loosening, deterioration, and electrochemical corrosion of hardware and joined material. Attachment of the chassis ground to a central office or other interior ground system should be made with a 6-AWG, copper ground conductor at a minimum.

⚠️

Warning **A readily accessible two-poled disconnect device must be incorporated in the fixed wiring.** Statement 1022

Power Connection Guidelines for DC-Powered Systems

The DC-input power supply allows the Cisco uBR10012 router to operate on either –48 or –60 VDC systems.

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Warning **Connect the unit only to DC power source that complies with the safety extra-low voltage (SELV) requirements in IEC 60950 based safety standards.** Statement 1033

✏️

Note The Cisco uBR10012 router (using DC power supplies) is not shipped with wiring to connect to a DC power source. You must provide input, return, and earthing (grounding) wiring at the site, and install and protect the wiring in accordance with local and national wiring regulations.

Cabling Guidelines

When planning the location of a new system, keep in mind signal type, signal speed, and transmission medium. Also, consider the distance limitations for signaling, EMI, and connector compatibility. The distance and rate limits shown are the IEEE-recommended maximum speeds and distances for signaling purposes. Use this information as a guideline in planning your network connections *prior to* installing the Cisco uBR10012 router.

Ethernet and Fast Ethernet Connections

The maximum distances for Ethernet and Fast Ethernet network segments and connections depend on the type of transmission cable being used. Table 2 shows the maximum transmission distances between stations for Ethernet and Fast Ethernet connections.

Table 2   Ethernet and Fast Ethernet Maximum Transmission Distances

Transceiver Speed	Cable Type	Transmission Mode	Maximum Distance Between Stations
10 Mbps	Category 3	Full duplex and half duplex	328 ft (100 m)
100 Mbps	Category 5	Full duplex and half duplex	328 ft (100 m)

Fiber-Optic Connections

The specifications for single-mode, fiber-optic transmissions are outlined in Table 3.

Table 3   Fiber-Optic Transmission Characteristics

Characteristic	Permissible Value		Characteristic	Permissible Value
Transmitter output power	–15 to –8 dBm		Wavelength	1261 to 1360 nm
Receiver sensitivity	–28 to –8 dBm		Maximum span	9 miles (14.5 km)

Note   Do not exceed the specified distance limits.

4   Chassis Installation

Tip   For easier installation, rest the chassis on an installation shelf while installing the chassis in a rack.

Rack-Mounting Guidelines

- Allow sufficient clearance around the rack for maintenance.You need 36 in. (91.44 cm) of clearance to remove and replace system components.
- If the Cisco uBR10012 chassis is the only unit in a rack, mount the chassis at the bottom of the rack. Use the rack-mount kit that comes with the Cisco uBR10012 chassis.
- Always place the heavier equipment in the lower half of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting the chassis.
- Make sure that Telco racks are bolted to the floor.
- When mounting the chassis in 4-post or Telco racks, use all the screws and brackets that are provided.
- For 23-inch racks, order optional mounting brackets from third-party vendors.

Installation Tools and Equipment

The tools and equipment listed below are recommended as the minimum necessary to install the Cisco uBR10012 router. Other equipment may include test equipment to check electronic and optical signal levels, power levels, and communications links.

- Rack-mounting kit (includes brackets and screws)
- Screwdrivers
    - Number 2 Phillips screwdriver
    - 3/16-inch flat-blade screwdriver
    - 1/4-inch flat-blade screwdriver
- Antistatic mat or antistatic foam and electrostatic discharge (ESD) grounding strap or the disposable ESD strap
- Wire stripper and crimping tool for preparing the ground connection (the accessory kit comes with ground lugs and M5 screws with captive, locking washers)
- Wire—6 AWG (16 mm), customer provided
- Tape measure and level (optional)
- Cable mounting brackets and ties (optional), used with RF switch

Verifying Contents After Unpacking

Power cables, manuals, and other additional items are packaged in separate boxes. After you have unpacked the system, verify that you have received all the required components and documentation.

Step 1 Using the packing list as a guide, verify that you have received everything that is listed, including the following:

  a. System hardware documentation and software documentation (if ordered)

  b. Optional equipment that you ordered, such as transceivers (GBICs), flash cards, cables, or special connectors

Step 2 Check that all line cards you ordered are installed in the chassis (including PCMCIA flash cards installed in the PRE).

Step 3 Ensure that the system configuration matches the packing list.

Removing Chassis Components Before Installation

The Cisco uBR10012 router is shipped with all ordered components already installed in the chassis. When fully configured, the Cisco uBR10012 chassis weighs approximately 230 lbs (104.3 kg).

⚠️

Caution   You must use a hydraulic lift or forklift to move a fully populated chassis.

In a fully loaded chassis, the components (modules and cards) weigh approximately 170 lbs (77.11 kg), so removing them allows the chassis to be safely moved and installed by two people. After the chassis has been installed in a rack, the components can be reinstalled in the chassis.

The following components should be removed from the chassis before installing the chassis in a rack.

- Fan assembly module
- AC or DC power entry modules (PEMs)
- Performance routing engine (PRE) modules
- Cable interface cards
- Network uplink cards

🔎

Tip   You do not need to remove the TCC+ cards or the LCD monitor because these do not present a significant increase in weight.


Before You Begin

- Make sure that you have an antistatic surface available for the components that you are removing from the chassis.
- Make sure that you are wearing antistatic protection such as a wrist strap or heel strap and are properly grounded.

Remove the Front Cover

Step 1 Remove the front cover by lifting it up slightly and then pulling the cover toward you (see Figure 3 on page 9).

Step 2 Carefully set it aside.

Figure 3   Removing the Front Cover
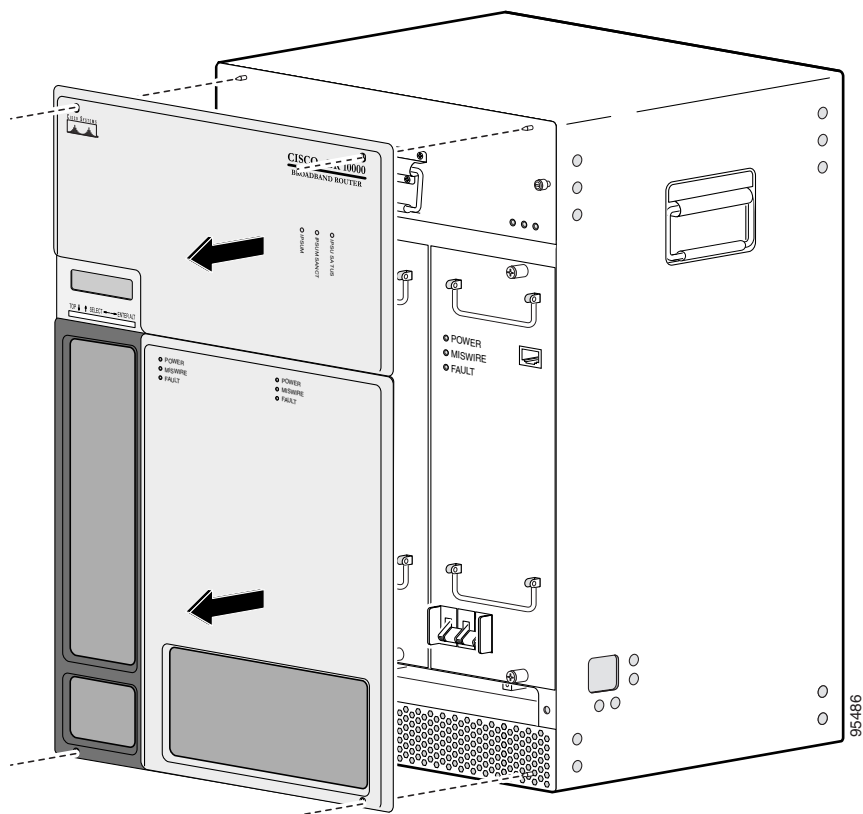
Remove the Fan Assembly Module

Step 1   Loosen the captive screws on each side of the fan assembly module. See Figure 4.
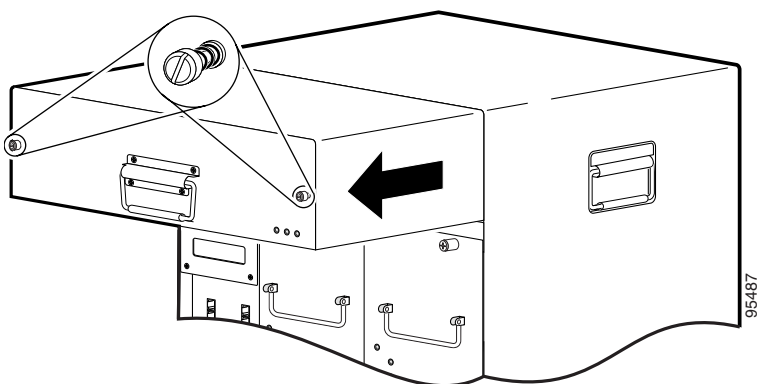
Step 2   Pull the fan assembly halfway out of the module using the handle, then use both hands to pull the module out of the router.

⚠️
Caution   The fan assembly module weighs approximately 30 lbs (13.61 kg). Be careful that it doesn't suddenly swing down as the module clears the router.

Figure 4   Removing the Fan Assembly Module

Step 3   Set the fan assembly module aside.

> ✎
>
> **Note**   You do not need to remove the fan assembly cable. The fan assembly pulls away from the cable as the module is removed from the router.

Remove the PEMs (DC and AC)

DC PEM

To remove the DC PEMs from the Cisco uBR10012 router, follow this procedure:

Step 1   Verify that the first DC PEM you are removing is turned off by pushing the three-levered power switch down to the OFF (0) position. Tape the switch in the OFF position.

Step 2   Use a screwdriver to loosen the captive screws (top and bottom).

Step 3   Using the two handles on the faceplate, pull the DC PEM straight out from the chassis. See Figure 5.

Step 4   Repeat Step 1 through Step 3 to remove the second DC PEM.

Figure 5   Removing the DC PEMS
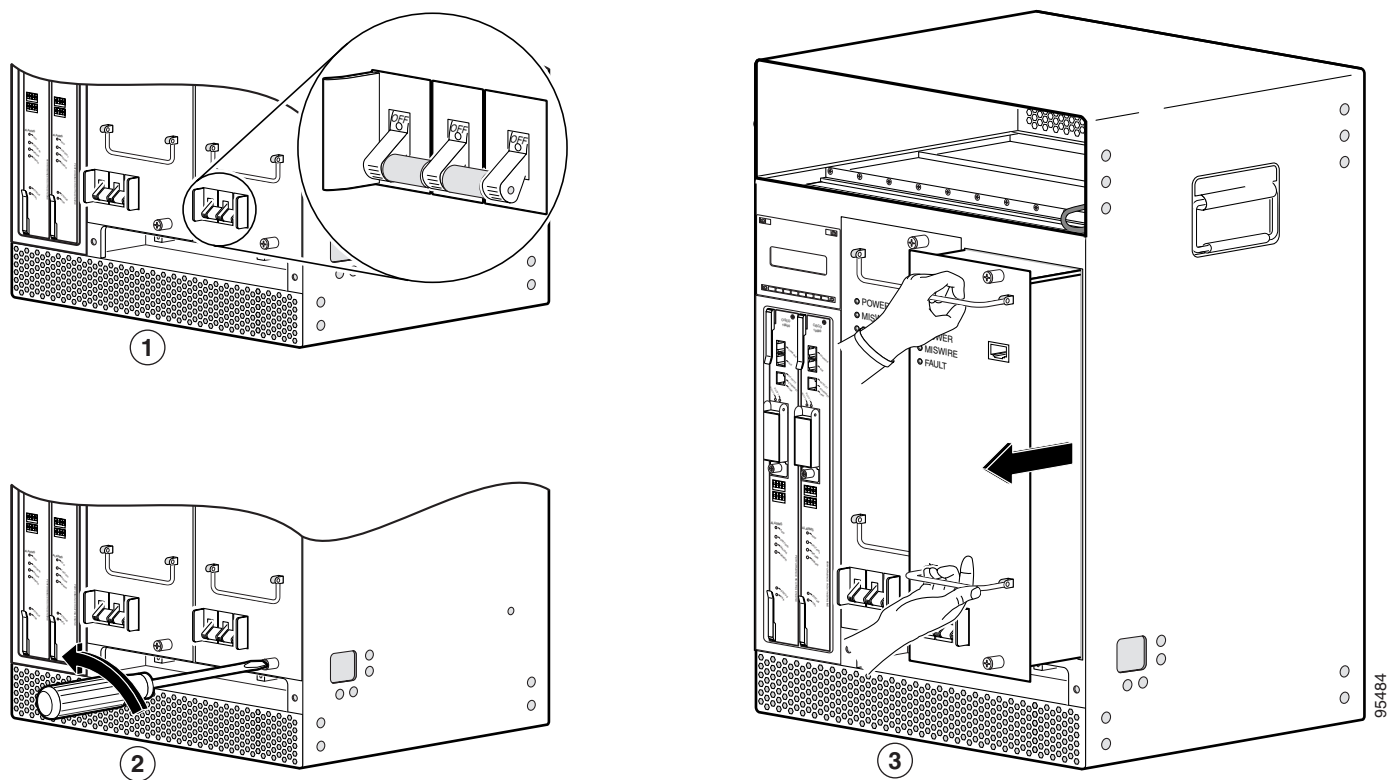
AC PEM

⚠️

Caution Because of safety compliance issues with the power cords, the AC PEM power rating is 200–240 VAC at 13 A instead of 16 A.

To remove AC PEMs from the Cisco uBR10012 router, follow this procedure:

Step 1 Verify that the power switch on the AC PEM is turned off. See Figure 6.

Step 2 Unplug and remove the AC-input power cord from the chassis cord clips, if applicable. Tape the AC power switch in the OFF position.

Step 3 Use a screwdriver to loosen the captive screws (top and bottom).

Step 4 Using the two handles on the faceplate, pull the AC PEM straight out from the chassis.

**Step 5** Repeat Step 1 through Step 4 to remove the second AC PEM.

Figure 6   ***Removing the AC PEM***
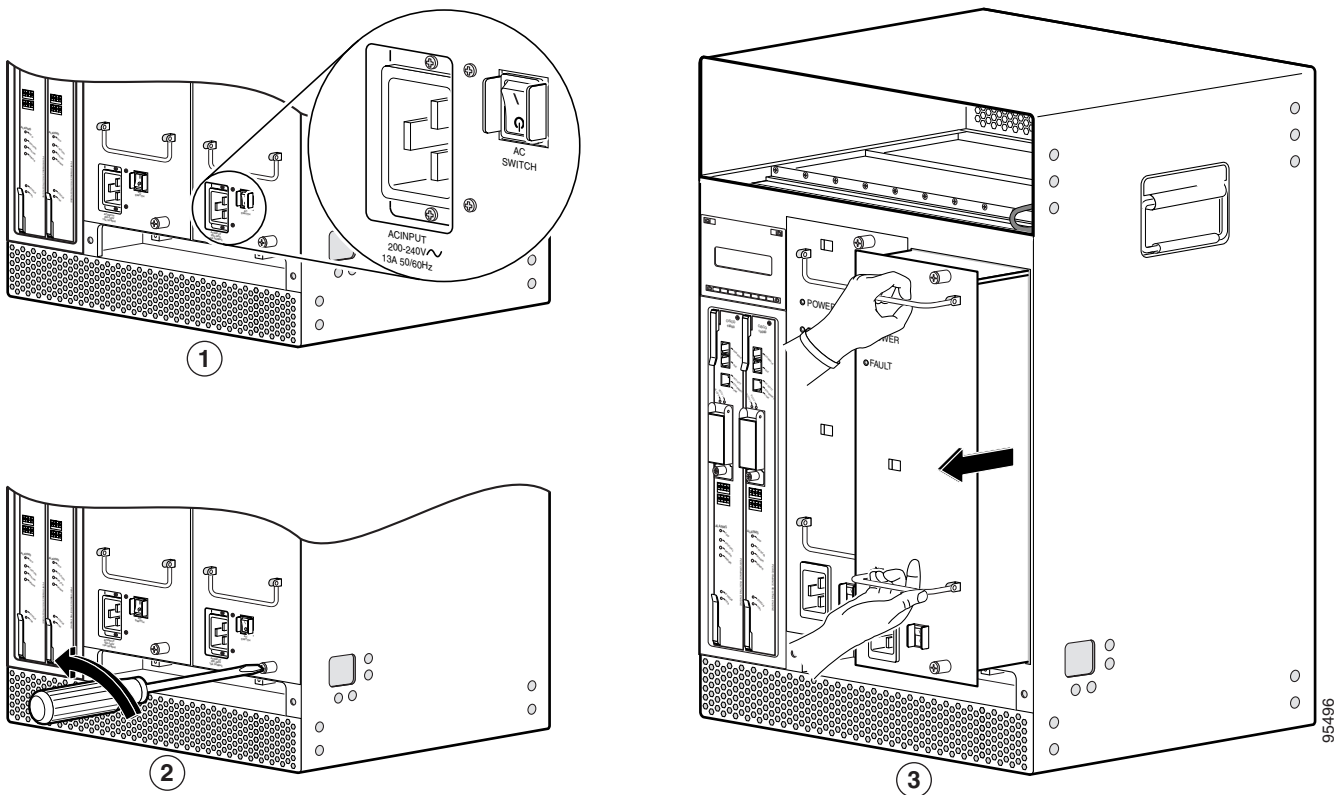
Remove the PREs

Step 1 Unscrew the captive screws (top and bottom) on the PRE module. See Figure 7.

Step 2 Simultaneously pivot both ejector levers away from each other to disengage the PRE module from the backplane.

Step 3 Slide the PRE module out of the slot and place it on an antistatic surface.

Figure 7   *Removing the PRE*
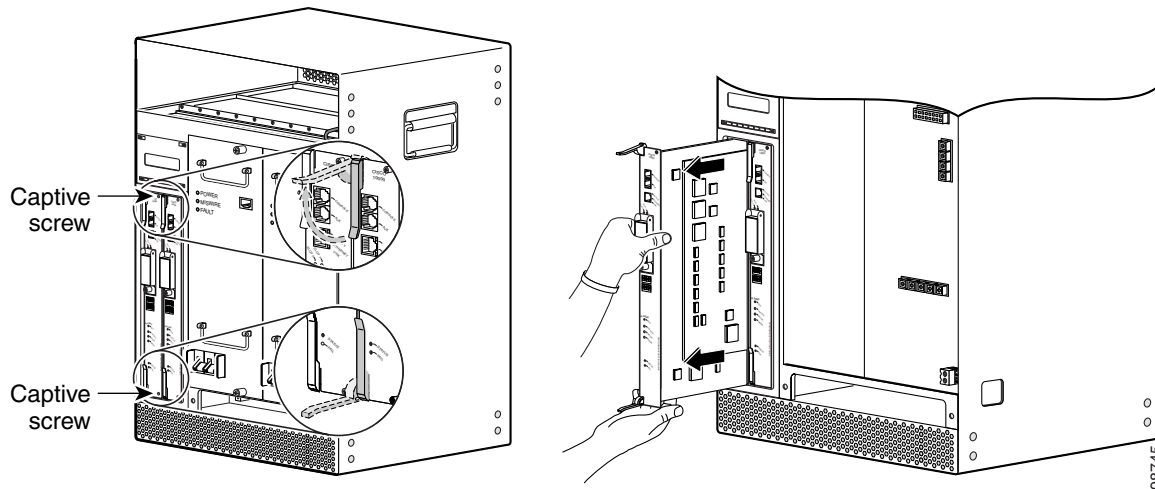
Remove the Interface Line Cards and Uplink Cards

⚠
Caution   If you are using the Cisco uBR10-LCP2-MC28 cards or the Cisco uBR10-LCP2-MC16 cards in your chassis, do not attempt to separate the cards (Cisco MC28 and Cisco MC16) from the Cisco uBR10-LCP2 adapter card while they are installed in the chassis. The cards must be removed from the chassis as a unit before they can be separated.

Step 1 Unscrew the captive screws (top and bottom). See Figure 8 on page 13.

Step 2 Simultaneously pivot both ejector levers away from each other to disengage the line card from the backplane.

Step 3 Grasp the faceplate with one hand and use your other hand to support the card as you pull it out of the chassis.
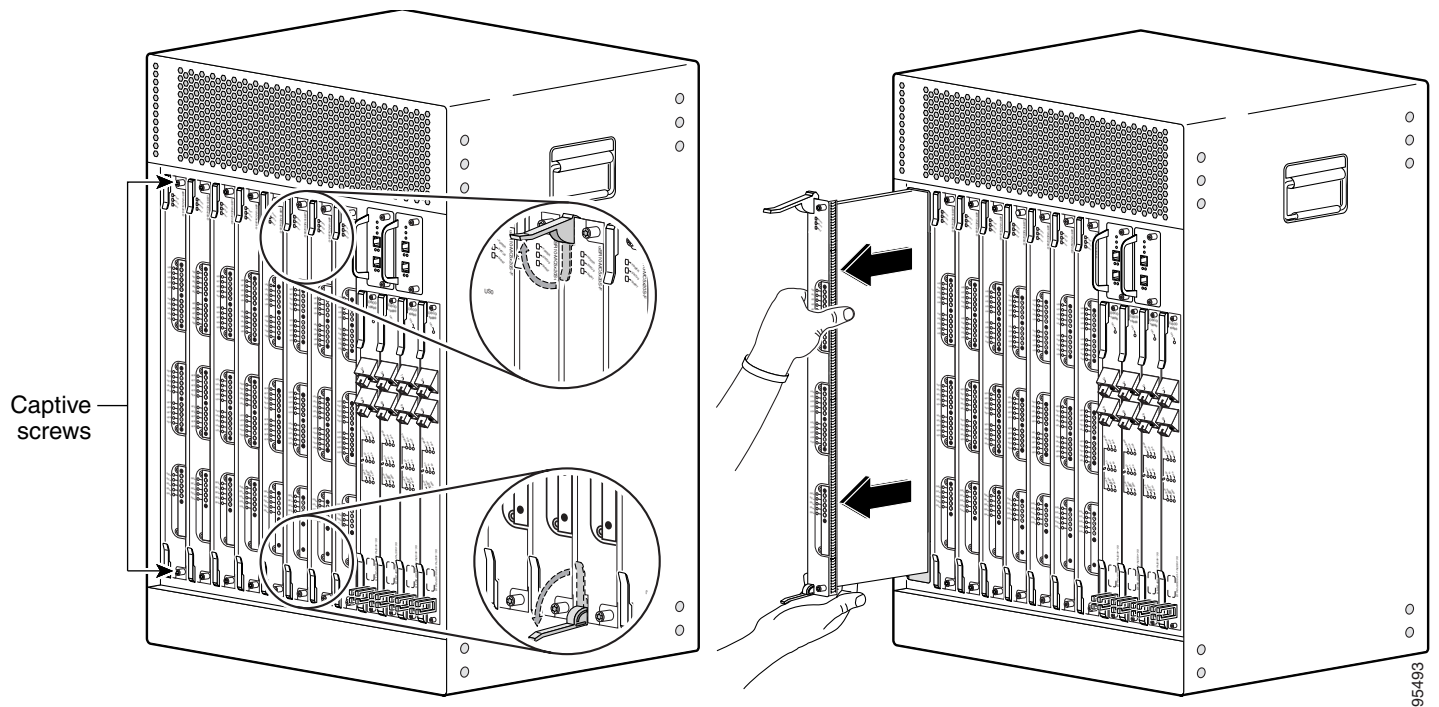
⚠
Caution   Some of the cards weigh as much as 16 lbs (7.3 kg).

Step 4 Place the card on an antistatic surface with the component side up.

Step 5 Repeat this procedure for the remaining line cards and uplink cards.

Figure 8   Removing Line Cards

Captive screws

Remove the HHGE Line Cards

✎
Note   If your chassis comes with the HHGE line cards, remove the line cards but do not remove the slot splitters.

Step 1   Loosen the top and bottom captive screws until they disengage and spring away from the HHGE face plate.

Step 2   Simultaneously pivot both ejector levers away from each other to disengage the line card from the backplane.

Step 3   Slide the line card out of the slot splitter and place it on an antistatic surface or in an antistatic bag.

Attaching the Mounting Brackets

The Cisco uBR10012 router is shipped with four mounting brackets that can be attached to either the front or rear of the chassis. The brackets can be mounted either flush with the edge of the chassis or set back to allow the chassis to be offset mounted in the rack.

✎
Note   For 23-inch racks, order optional mounting brackets from third-party vendors.

Step 1   Determine whether you are mounting the chassis with the front or the rear facing forwards.

Step 2   Determine whether you are flush-mounting or offset-mounting the chassis. Typically, flush-mounting is used for most equipment racks except for Telco racks that require offset-mounting.

Step 3   Attach the large mounting bracket to the top of the chassis, and the smaller bracket to the bottom of the chassis, with the screws that are supplied with the brackets.

Figure 9 shows how to attach the brackets to flush-mount the chassis with the rear forward.

Figure 10 shows how to attach the brackets to flush-mount the chassis with the front forward and how to attach the brackets to offset-mount the chassis with the front forward.

✎
Note   You must use three screws to install each large bracket and two screws to install each small bracket.

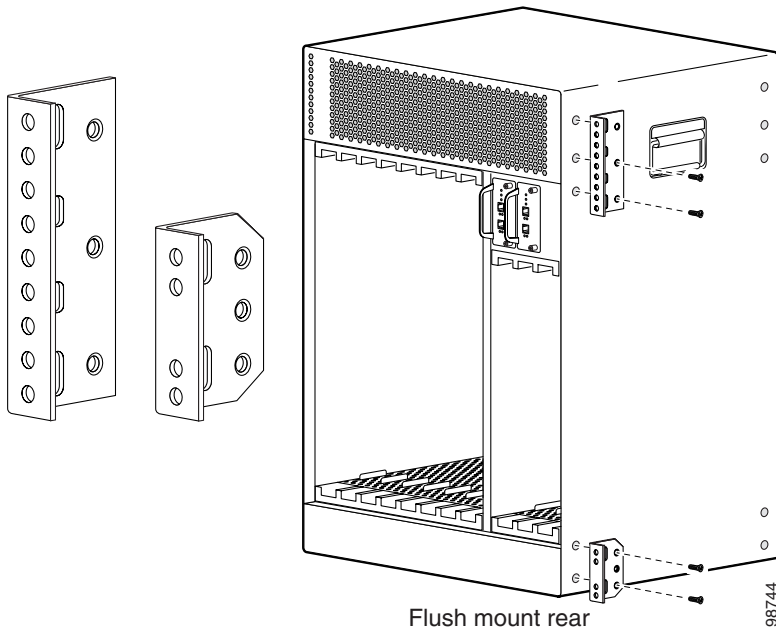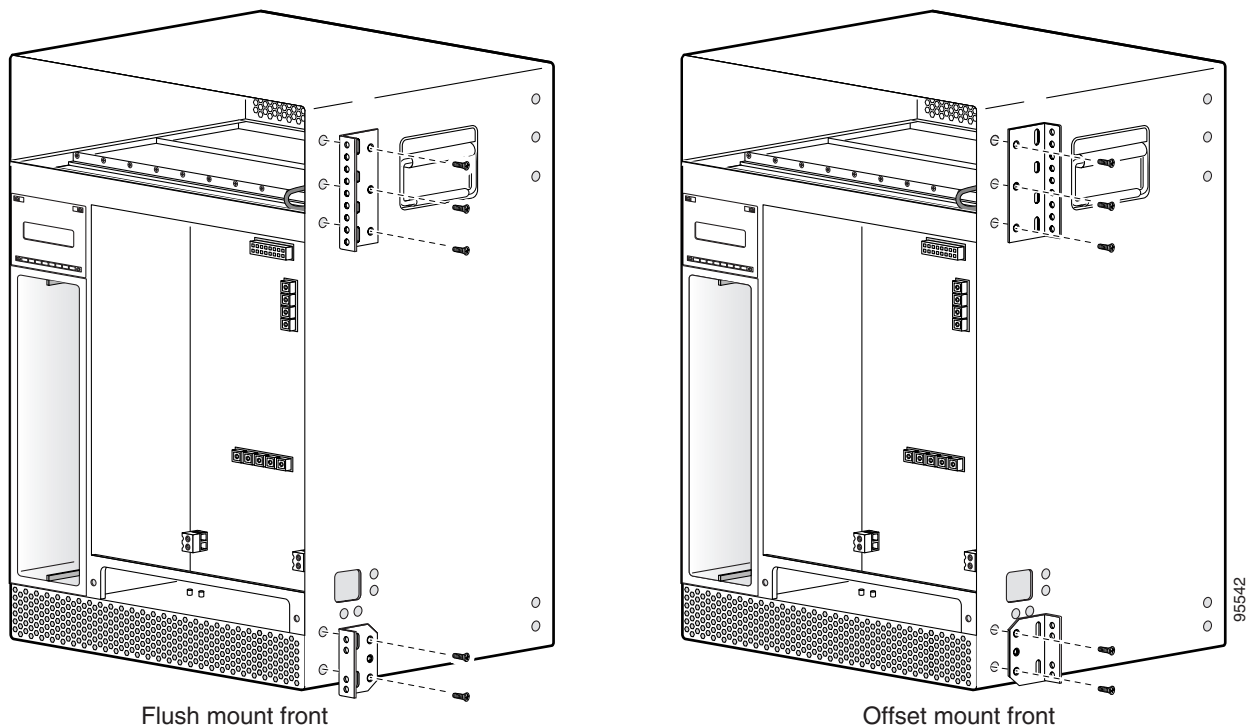***Figure 9   Installing the Mounting Brackets—Flush-Mount Rear***

Flush mount rear

Figure 10   Installing the Mounting Brackets—Flush Mount Front and Offset Mount Front

Flush mount front   Offset mount front

Installing the Chassis in the Rack

With the fan assembly, PEMs, PREs, line cards, and uplink cards removed from the chassis, and the mounting brackets installed, the Cisco uBR10012 chassis is ready for installation in a 19-inch equipment rack or Telco rack.

⚠
Caution The Cisco uBR10012 chassis with all the components removed still weighs 60 lbs (27.22 kg). Take all necessary precautions when rack-mounting this chassis. A minimum of two people and a maximum of three people are required for installing this chassis in a rack.

⚠
Warning **To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety.** Statement 1006

 – This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
 – When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
 – If the rack has with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

Optional AC Power Shelf

If you are installing the AC power shelf, read the installation instructions that come with the shelf or see *2400W AC-Input Power Shelf for the Cisco uBR10012 Universal* at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ubr10012/frus/ub10acsh.htm

⚠
Caution If you are using the optional AC-input power shelf, do not install the shelf until after you have installed the Cisco uBR10012 chassis to avoid the possibility of crushing the shelf during the router's installation.

Install the Chassis

To install the chassis in the rack, follow this procedure:

🔎
Tip (Optional) Install an equipment shelf in the rack to support the Cisco uBR10012 router chassis. This simplifies installation and provides additional support for the chassis. If you are installing an equipment shelf, it must be able to support the weight of a fully loaded chassis, which is approximately 230 lbs (104.3 kg).

⚠
Caution Two people are required to lift this chassis. Three people might be needed to position the chassis into a rack, depending on whether you are using an equipment shelf and on how high you are mounting it.

 If you have to lift the chassis to a higher location, have a third person present who can lift the middle of the chassis as the other two people lift it straight up.

Step 1 With a person standing on either side of the chassis, grab one of the handles on the side of the chassis and use the other to steady the chassis.

Step 2 Carefully lift the chassis straight up and carry the it to the rack.

Step 3 When you reach your destination, lower the chassis to the ground.

🔎
Tip To prevent injury, keep your back straight and lift with your legs, not your back.

Step 4 Taking hold of the chassis, lift the chassis up to the height that it will be positioned in the rack.

**Note** The chassis is usually installed in the bottom of the rack.

Step 5 Maneuver the chassis into position in the rack.

Step 6 Align the mounting bracket holes with the rack post holes and attach the chassis to the rack with the appropriate-sized screws (performed by the third person, unless the chassis is resting on the bottom of the rack or a shelf).

Note Figure 11 shows the chassis flush-mounted at the rear. The procedure is identical for the other mounting methods.

Figure 11   *Installing the Chassis in a Rack*
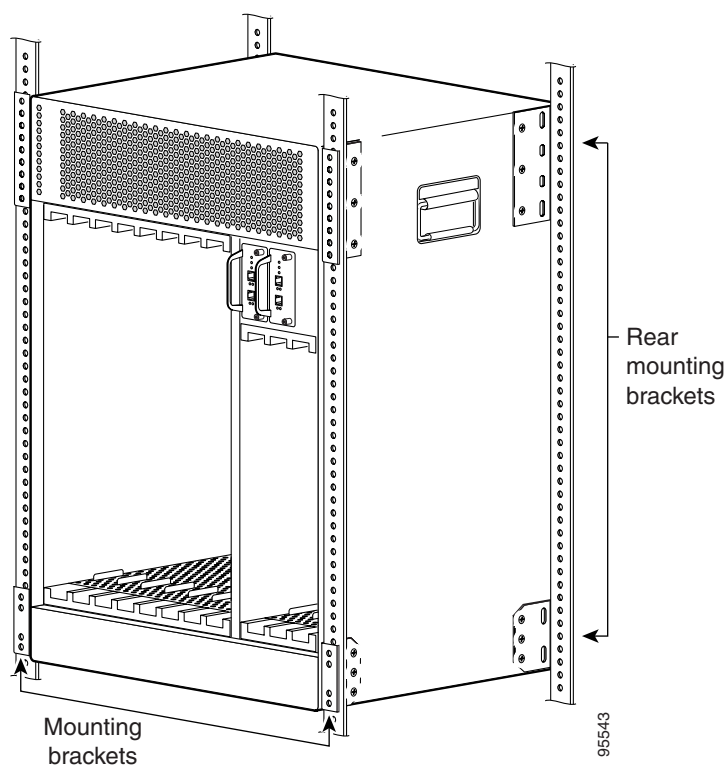
Connecting the Chassis to Ground

Connecting the Cisco uBR10012 router chassis to earth ground is required for all AC or DC-powered installations. Have the recommended tools and supplies available before you begin this procedure.

Warning **This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.** Statement 1024**.**

Caution The importance of proper grounding cannot be overemphasized. It will minimize the potential for damage to your system and maximize safety at the system site. We recommend that you consult a licensed electrician or your local electric utility company if you have any questions.

Recommended Tools and Supplies

Qty	Description	Comments
1	Number 2 Phillips screwdriver	—
1	Wire stripping tool	—
1	Crimping tool	Must fit diameter of grounding lugs.
1	2-hole grounding lug	Included in accessory kit shipped with the Cisco uBR10012 router.
1	Grounding wire	6 AWG (16 mm^2), customer provided.
2	M5 PEM screws with captive, locking washers	Included in accessory kit shipped with the Cisco uBR10012 router.
1	Antistatic mat and ESD-wrist strap	—

Attach the Grounding Cable

Warning **When installing the unit, always make the ground connection first and disconnect it last.** Statement 42

**Warning** **Use copper conductors only.** Statement 1025

Warning **Before performing any of the following procedures, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.** Statement 7

Step 1 Verify that no power source is connected to the Cisco uBR10012 chassis (the PEMs are not installed yet).

Step 2 Strip about 3/4 in. (2 cm) of the covering from the end of the grounding wire.

Step 3 Insert the stripped end of the grounding wire into the open end of the grounding lug, and crimp the grounding lug securely to the wire. See Figure 12.

Step 4 Using the two M5 screws provided in the accessory kit, fasten the grounding lug firmly to the bottom of the chassis.

Step 5 Attach the other end of the ground cable to a suitable grounding location in accordance with local practice at your site.

Figure 12   Ground Location
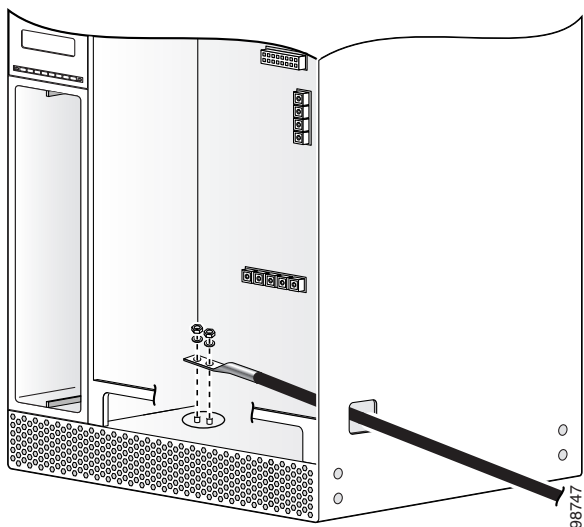
Connecting –48/–60 VDC Power to the Cisco uBR10012 Router

The DC power sources can be present at the site, or they can be provided by the optional 2400W AC-input power shelf. If you are using the 2400W AC-input power shelf, be certain you have already installed it, as described in the 2400W AC-Input Power Shelf Installation Guide.

✎
Note   For full power redundancy, each terminal block must be connected to a separate power source. If you are using the optional 2400W AC-input power shelf, full power redundancy requires that each of the AC power supplies in the shelf be connected to AC power sources that are on separate circuit breakers.

⚠
Warning   **Before performing any of the following procedures, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.** Statement 7

Equipment

- Wire stripper
- DC power leads (4)

Step 1   Verify that the DC power source to the chassis is turned off (tape it in the OFF position, if possible).

⚠
Caution   Do not connect power to the DC power sources or apply power to the chassis. This is done as part of the system startup after all connections are made.

If you are using the 2400-W AC-input power shelf as the DC power source, verify that the AC-input power cords are not plugged into AC power outlets.

Step 2   Strip no more than 5/16 in. (8 mm) of insulation off the ends of the DC power leads.

Step 3   Route the two sets of DC power leads through the square hole at the right front of the chassis. See Figure 13.

Step 4   Connect the DC power lead from the first external power source to the –48 V terminal in the DC terminal block, and the return wire (RTN) to the top terminal in the terminal block.

Step 5   Repeat Step 4 to connect the second DC power source.

Figure 13   Connecting the DC Power Cables in the Chassis
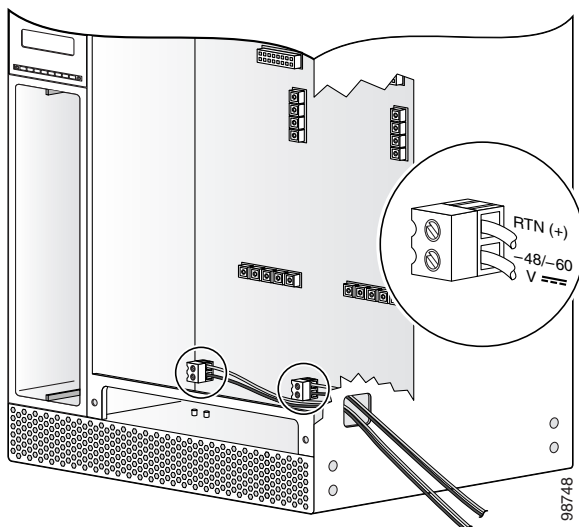
Step 6 If you are connecting visual or audio alarm indicators to your system, go to the "Connecting the Alarm Indicators" section on page 19.

Step 7 If you are not connecting any alarm indicators, go to the "Replacing the Modules" section on page 20.

Connecting the Alarm Indicators

The Cisco uBR10012 router provides relay contacts for optional (customer-supplied) audible or visual alarm indicators. Relay contacts are provided for three levels of severity.

⚠

Caution The alarm contacts on the Cisco uBR10012 router are only relays and do not provide any power from the unit. These relays are rated for 60 VDC, 1 A maximum—ensure that the connected alarm equipment does not exceed these voltage and current ratings.

⚠

Warning **Use copper conductors only.** Statement 1025

Equipment

- Two wires for each set of relays, or six separate wires to connect all three relay contacts
- Wire stripper

🔍

Tip Use the gauge of wire required by the audible or visual alarm indicator equipment you are using (14 AWG, max.)

To connect an alarm indicator to the chassis, follow this procedure:

Step 1 Obtain sufficient wire for the desired connections.

Step 2 Strip approximately 0.31 in. (8 mm) of insulation off the ends of the alarm indicator wire.

Step 3 Connect one set of alarm indicator wires to the alarm terminal block as follows:

    a. Connect one lead to the common (COM) terminal.

    b. If you are wiring the router in with other equipment for the alarm indicators, connect the other lead to the normally closed (NC) terminal.

    c. If you are wiring the router in parallel with other equipment for the alarm indicators, connect the other lead to the normally open (NO) terminal.

✎

Note Figure 14 on page 20 shows the wiring configuration for NO alarm relays. For NC alarm relays, use the NC contacts.

Step 4 Repeat Step 3 for the remaining alarm indicators

Step 5 Secure the alarm and power cabling to the chassis:

    a. Feed a tie wrap through the square slot on the left front side of the chassis (next to the alarm indicator terminal block).

    b. Bind the wires to the chassis using the tie wrap.

Figure 14   Alarm Terminal Block Connections
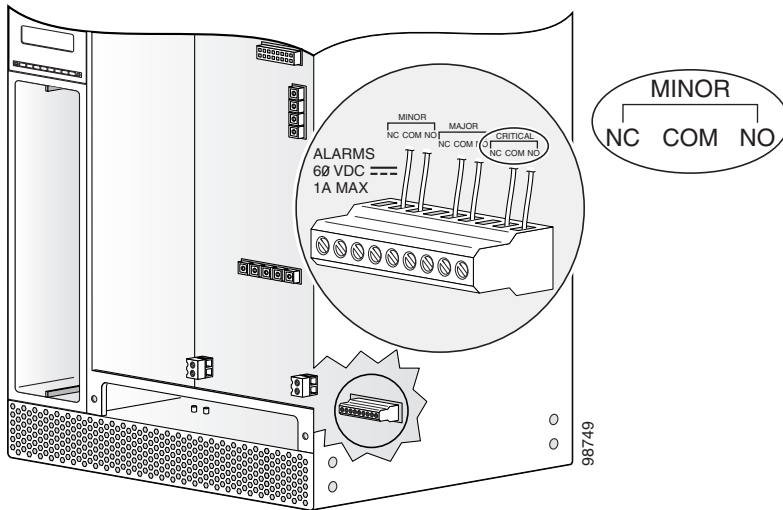
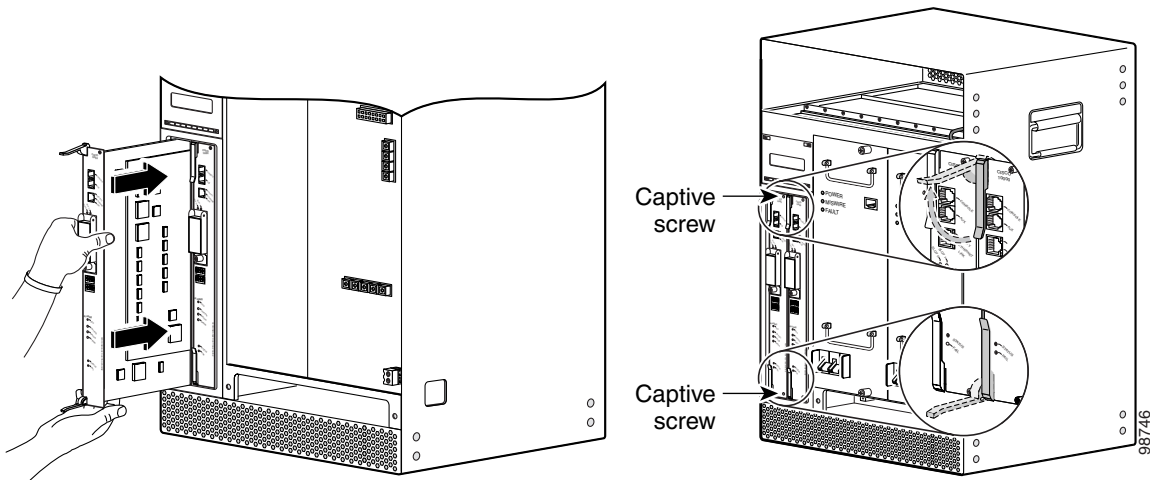# Replacing the Modules

PRE Modules

Step 1 Align the PRE module with the card guides in the slot. See Figure 15.

Step 2 Slide the card into the slot until you can feel it seat in the backplane connectors.

Step 3 Close the ejector levers to secure the card in the backplane, and tighten the captive screws to secure the card in the chassis.

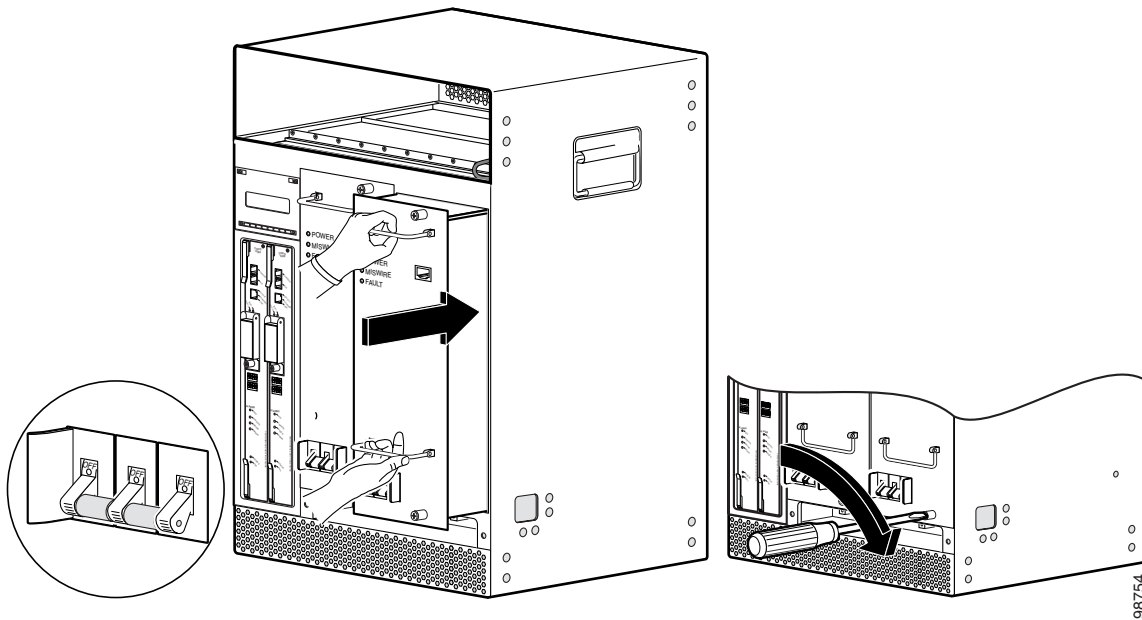*Figure 15   Installing the PRE Module*

DC Power Entry Modules

Step 1 Verify that the power switch is in the OFF position.

Step 2 Position the first DC PEM in the power bay and push it forward, verifying that it goes all the way in and makes a secure connection with the backplane. See Figure 16.

Step 3 Tighten the captive screws to secure the DC PEM.

Step 4 Repeat these steps to install the second DC PEM.

⚠

Caution Make sure that the alarm cables and the DC cables are out of the way before you slide the PEMs into the power bay.

Figure 16   *Installing a DC PEM*


AC Power Entry Modules

Do not use the DC terminal blocks when you are using the AC PEMs. Verify that the DC terminal blocks are not connected to any wires before proceeding with the installation. AC PEMs are rated for 200–240 VAC at 13 A.

Step 1 Verify that the power switch on the AC PEM is in the OFF position.

Step 2 Position the AC PEM in the power bay and push it forward, verifying that it goes all the way in and makes a secure connection with the backplane.

Step 3 Use a screwdriver to tighten the captive screws.

Step 4 Plug the AC-input power cable into the power receptacle on the front of the AC PEM.

Step 5 Route the power cable up the front of the AC PEM and clip it into the two plastic retaining clips. The power cables go out through the notch on the right side of the front cover when it is installed.

Step 6 Plug the other end of the AC-input power cable into a 200–240 VAC power outlet. The FAULT LED on the AC PEM is yellow, indicating that the AC PEM is receiving power from the power source, but is not yet supplying power to the Cisco uBR10012 chassis. Do not turn on the power yet.

Figure 17   AC PEM Standby Position
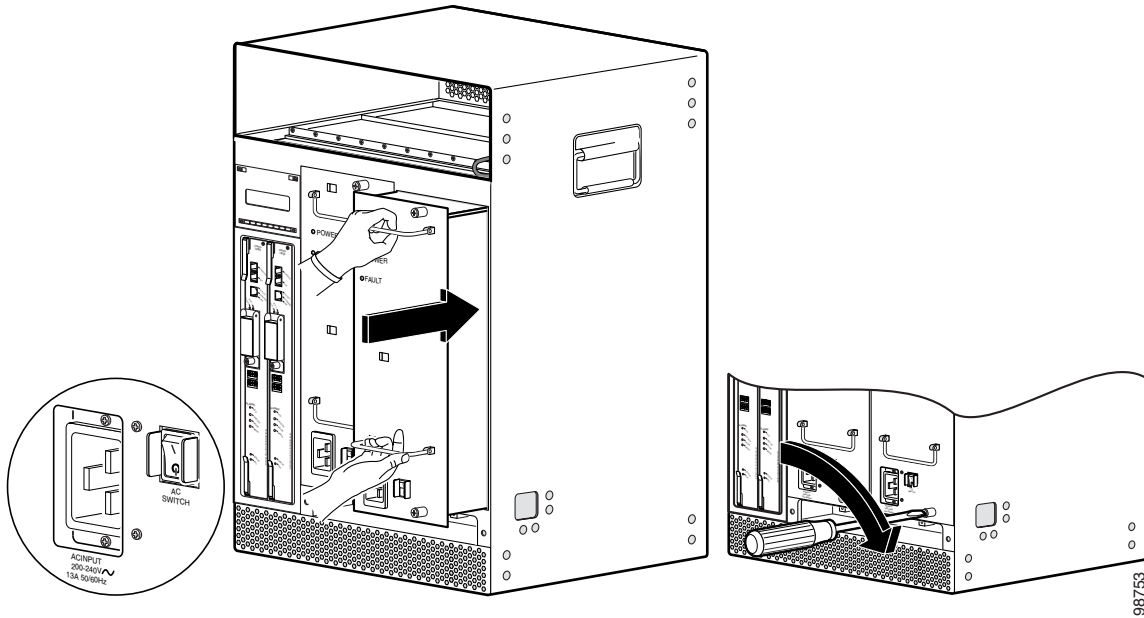
Fan Assembly Module

Step 1   Using two hands, pick up the fan assembly module.

> ⚠️
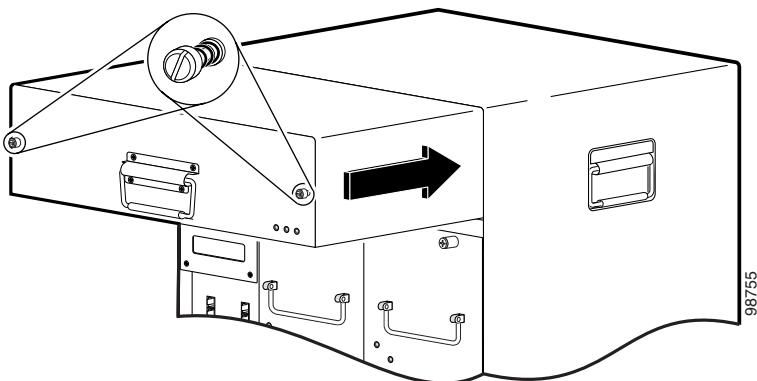> **Caution**   The fan assembly module weighs approximately 30 lbs (13.61 kg)

Step 2   Align the module with the rails in the chassis. See Figure 18.

Step 3   Push the fan module back firmly into the chassis, making sure that the module securely connects to the backplane.

Step 4   Tighten the captive screws on each side of the fan assembly module.

Figure 18   Replacing the Fan Assembly

Line Cards and Uplink Cards

⚠️
Caution   The Cisco uBR10-LCP2-MC16 or -MC28 cable interface line card must be installed as one unit. Do not install the card adapter carrier (Cisco uBR10-LCP2) without the line card. Cisco uBR-MC5x20 cards are used in the example. Always check the captive screws that secure the line card to the adapter card (card carrier) before installation.

Step 1   Align the upper and lower edges of the card with the upper and lower guides in the chassis. See Figure 19.

🔍
Tip   Grasp the faceplate of the card with one hand and place your other hand under the card carrier to support the weight of the card. The cards can weigh up to 16+ lbs.

Step 2   Slide the card into the slot until you can feel it seat in the backplane connectors.

Step 3   Close the ejector levers to secure the card in the backplane, and tighten the captive screws to secure the card in the chassis.

⚠️
Caution   To ensure that there is adequate space for additional cable interface line cards, always tighten the captive screws on each newly installed card before you insert any additional cards. The captive screws prevent accidental removal and provide proper grounding for electromagnetic interference (EMI) shielding.

Step 4   Repeat Step 1 through Step 3 for each cable interface line card and network uplink line card.

Figure 19   Replacing the Line Cards and Uplink Cards
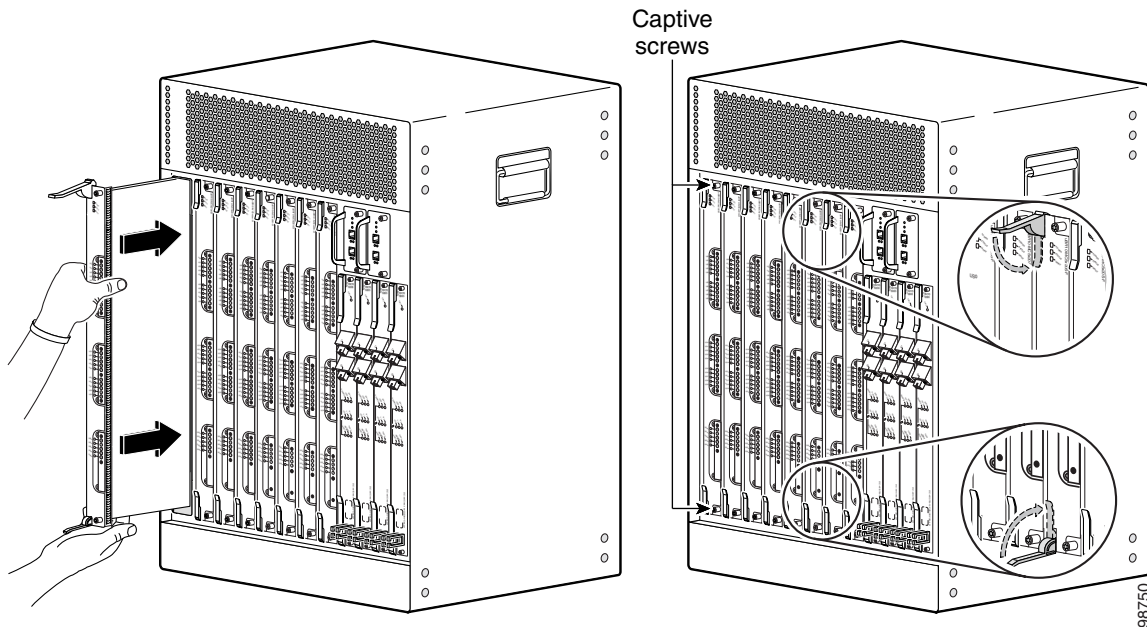
Replacing the HHGE Line Cards

⚠️
Caution   Always install the HHGE line cards in a slot splitter. Slot splitters must be installed in slot 3 or slot 4 of the chassis. If you have a blank slot, always install a blank slot cover. Use half-height slot covers when you have a single open HHGE slot. Use full-height slot covers in all other situations.

Step 1 Grasp the faceplate of the line card with one hand and place your other hand under the card carrier (to support the weight of the card). Position the card in front of the slot splitter.

Step 2 Carefully align the upper and lower edges of the line card with the upper and lower guides in the slot splitter, and slide the line card about half-way into the splitter.

Step 3 Be sure the ejectors are in the open position and continue to push the line card into the splitter until you can feel it begin to seat in the backplane connectors.

Step 4 Verify that the captive screws are properly aligned with the captive screw holes in the splitter. If the captive screws are not properly aligned, the card will not seat properly in the backplane.

Step 5 Simultaneously pivot both ejector levers toward each other (until they are parallel to the faceplate) to firmly seat the card in the backplane.

The HHGE line card cycles through its power-on self-test. The FAIL LED lights during portions of the POST (Power-On Self Test), but remains off after POST on a properly working line card. If the FAIL LED remains on, go to the "Troubleshooting" section on page 35.

5   Connecting Cables

Tip To reduce the chance of interference, avoid crossing the power cables with any of the interface cables. Verify all cabling limitations (particularly distance) before powering on the system.

Connect the Console Port and the Auxiliary Port

See Figure 20 on page 25. The PRE module has two asynchronous serial (EIA/TIA-232) RJ-45 ports for connection to a console (an ASCII terminal or a PC running terminal emulation software) and modem for remote access. The cables and adapter are included in the accessory kit.

Equipment

- RJ–45 to RJ–45 crossover cable
- RJ–45 to DB–9 female DTE adapter (TERMINAL)
- RJ–45 to DB–25 male DCE adapter (MODEM)

Tip The crossover cable reverses the pins from one end of the cable to the other. The color of the wire at pin 1 is the same color as the wire at pin 8 on the opposite end of the cable (pin 2 to pin 7, pin 3 to pin 6, and so on.).

Console Port

The console port provides local administrative access to the router and its command-line interface (CLI).

Note Each PRE module must have a console port connection (typically to a terminal server) when running a redundant configuration in the chassis.

Step 1 Connect one end of the RJ-45 crossover cable to the serial RJ-45 port (labeled CONSOLE) on the PRE module.

Step 2 Run the other end of the crossover cable through the square hole at the left front side of the chassis, and connect it to the RJ-45-to-DB-9 adapter.

Step 3 Connect the adapter to the appropriate serial port on the PC or terminal to complete the console port cable connection.

Figure 20   Console and Auxiliary Port Connection on the PRE Module

Pin 1 —
Pin 2 —
Pin 3
Pin 6

How to identify
a crossover cable

Console port   Auxiliary port

Crossover cable to
DB9 or DB25 connector

98751
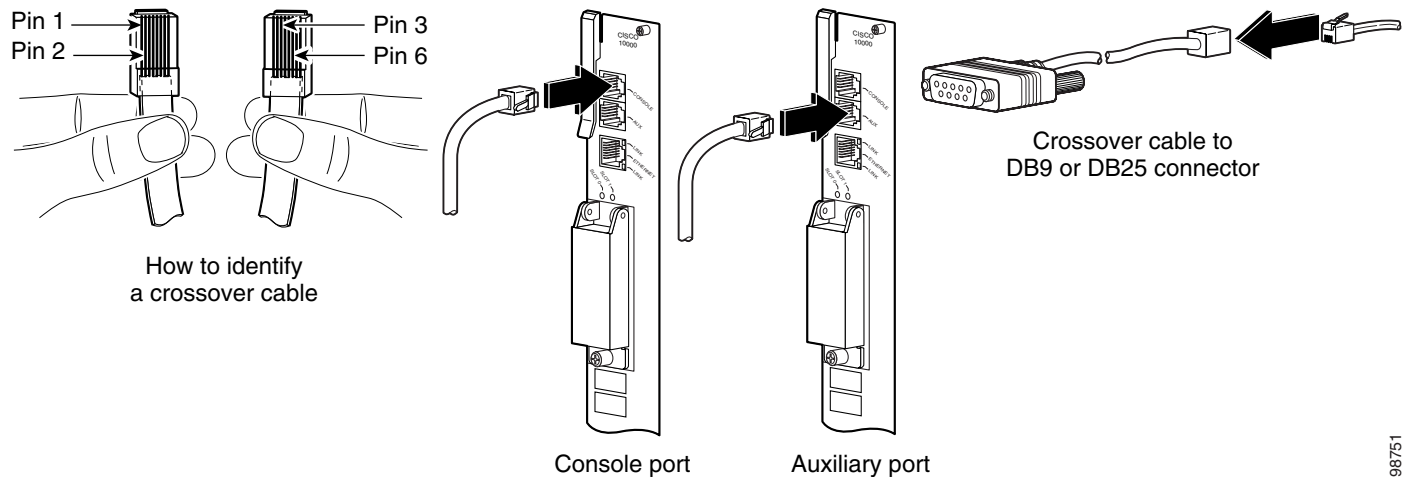
Auxiliary Port

The auxiliary port provides a connection for a modem to allow remote access to the router and its command-line interface (CLI).

Step 1   Connect one end of the RJ-45 crossover cable to the serial RJ-45 port (labelled AUX) on the PRE module (Figure 20).

Step 2   Run the other end of the crossover cable through the square hole at the left front side of the chassis, and connect it to the RJ-45-to-DB-25 adapter.

Step 3   Connect the adapter to the serial port on the modem to complete the auxiliary port cable connection.

Connecting Ethernet Network Management Cables

The PRE module provides an Ethernet port to a LAN for a 10BASE-T or 100BASE-T connection for network management.

Note   The PRE module also contains an internal Ethernet interface (ethernet0/0/0) that it uses for inter-module communications. This interface is invisible and transparent for normal operation. Do not confuse this internal interface, which is not user-accessible or user-configurable, with the PRE module's external Fast Ethernet interface (fastethernet0/0/0).

Note   Each PRE module needs an Ethernet port connection (typically to the same Ethernet hub) if you are running a redundant configuration in the chassis. However, only the active PRE module has an active Ethernet connection to the network.

Equipment

- An Ethernet hub (such as a Cisco Micro Hub)
- An Ethernet cable that meets the following specifications:
    - RJ-45 (male) to RJ-45 (male) straight-through cable (see Figure 21 on page 26)
    - 100-ohm category 3, 4, or 5, no longer than 328 feet (100 meters)

Tip The color of the wire connected to pin 1 (left-most) on the connector at one end of the cable, should be the same color as the wire connected to the left-most pin on the connector at the other end of the cable. The same rule applies to pins 2 through pin 8 on each connector.

Figure 21   Straight-Through Cable

How to identify a
straightthrough cable
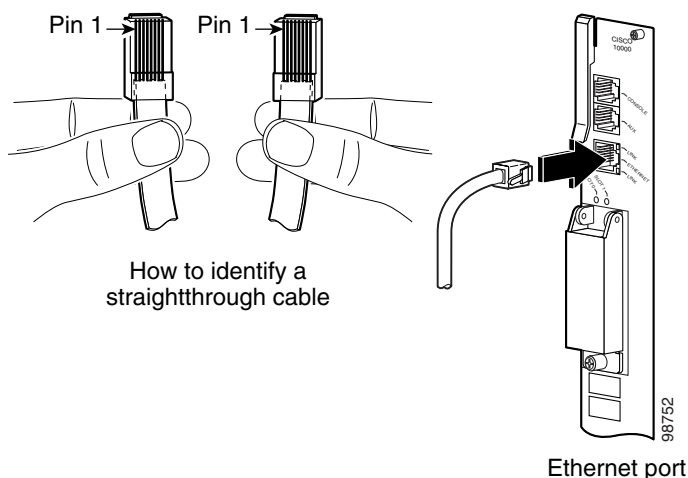
Ethernet port

10BASE-T Ethernet Network

To connect the PRE to a 10BASE-T Ethernet LAN, follow this procedure:

Step 1 Connect one end of the Ethernet cable to the RJ-45 port on the primary PRE labeled Ethernet.

Step 2 Connect the other end of the cable to any unoccupied port on the Ethernet hub.

100BASE-T Ethernet Network

The RJ-45 port on the PRE is configurable for 100-Mbps full-duplex or half-duplex operation (half-duplex is the default) and supports IEEE 802.3, Ethernet, and IEEE 802.3u interfaces compliant with 100BASE-T specifications.

Caution If the Cisco uBR10012 router is used in an environment in which lightning-induced transients are likely to couple to the signal lines, use of shielded interconnection cables for the 100BASE-T ports is highly recommended. In addition, use of shielded interconnection cables for the 100BASE-T ports is required to meet Telcordia GR1089 CORE Section 4.5.9 and ETSI Section 5.2.2.2 (intra-building lightning surge).

To connect the PRE to a 100BASE-T Ethernet LAN, follow these steps:

Step 1 Connect one end of the Ethernet cable to the RJ-45 port on the primary PRE, labeled Ethernet.

Step 2 Run the cable up and through the cable management bracket and connect the other end of the Ethernet cable to any unoccupied port on the Ethernet hub.

Tip When power is applied to the chassis, check the LNK (Link) LED on the PRE faceplate port next to the Ethernet port. This LED comes on (green) if the PRE is correctly connected to the Ethernet LAN.

Connecting the Data Network Cables

Attenuation

The Cisco MC16C. Cisco MC16S, and MC28C line cards with the adapter card may require an attenuator in the downstream configuration. The output is higher (+42 dBmV) and may overload the external upconverter input. Overdriving an external upconverter may cause degraded bit error rate (BER), clipping and compression or distortion in the upconverter and possible interference with adjacent channels.

✎
Note Neither the Cisco uBR-MC16E cable interface line card nor the Cisco uBR10-MC5X20S/U/H needs additional attenuation in the downstream path.

Upconverters

Table 4 lists the IF-to-RF upconverters that we recommend, and indicates whether a 10-dB attenuator is required.

Beginning with Cisco IOS Release 12.2(15)BC2, Cisco now supports IF muting with non-SNMP upconverters. In previous releases, IF muting was not available for non-SNMP upconverters and this limited the availability of N+1 redundancy in some circumstances. For additional information about IF muting and N+1 redundancy, refer to *N+1 Redundancy for the Cisco Cable Modem Termination System* at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/cab_rout/cmtsfg/ufgnpls1.htm

Table 4   *Recommended IF-to-RF Upconverters*

IF-to-RF Upconverter	Need 10-dB Attenuator?	URL
Motorola/General Instrument C6U, C8U	Yes	http://www.gi.com
Vecima MA4040B, Vecima HD4040	Yes	http://www.vecima.com
Scientific Atlanta Continuum 9860, 9861	No	http://www.scientificatlanta.com

Cable Interface Line Card Cables

Equipment
- Dense Connector cable kit
- F connector cables

To cable the cable interface line card, follow these steps:

Step 1 Connect the upstream (US) cables to an RF switch or the other headend equipment.

Step 2 Connect the downstream (DS) cables to the IF-to-RF upconverter, if necessary. If you are using an attenuator, install it on the upconverter F-connector before installing the cable.

Uplink Line Card Fiber-Optics Cables

Optical connectors are very sensitive to any dust particles or other contaminants. Cleaning the optical connections on the cables and verifying the output power of the interface module helps to prevent damage to the fiber optics and system failure. To keep the connections as clean and contaminant-free as possible, always clean fiber-optic connections before installing the cables and always use protective caps on the connectors that are not cabled. For cleaning information see *Inspection and Cleaning Procedures for Fiber-Optic Connections* at the following URL: http://www.cisco.com/warp/public/127/cleanfiber2.html

🔍
Tip Inspect and clean the bulkhead connection first, and then inspect and clean the fiber cable just before you install it into the bulkhead connector.

Warning	⚠ Class 1 laser product. Statement 1008.

Warning	⚠ Invisible laser radiation present. Statement 1016.

Warning	⚠ Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 1051.

Equipment

- Fiber-optic cables

To connect the fiber cable to the uplink line card, follow this procedure:

Step 1 Remove the protective cap from the fiber-optic cable connectors.

Step 2 Clean the fiber-optic connections (bulkhead connector and cable).

Step 3 Attach the fiber- optic cable to the port receptacles. See Figure 22. Be sure that you connect the TX and RX ends of the cable to the corresponding TX and RX connectors on the port.

Step 4 Run the cable through the cable bracket at the bottom of the line card and then out to the left or right of the chassis.

Figure 22   Installing the Fiber-Optic Cables
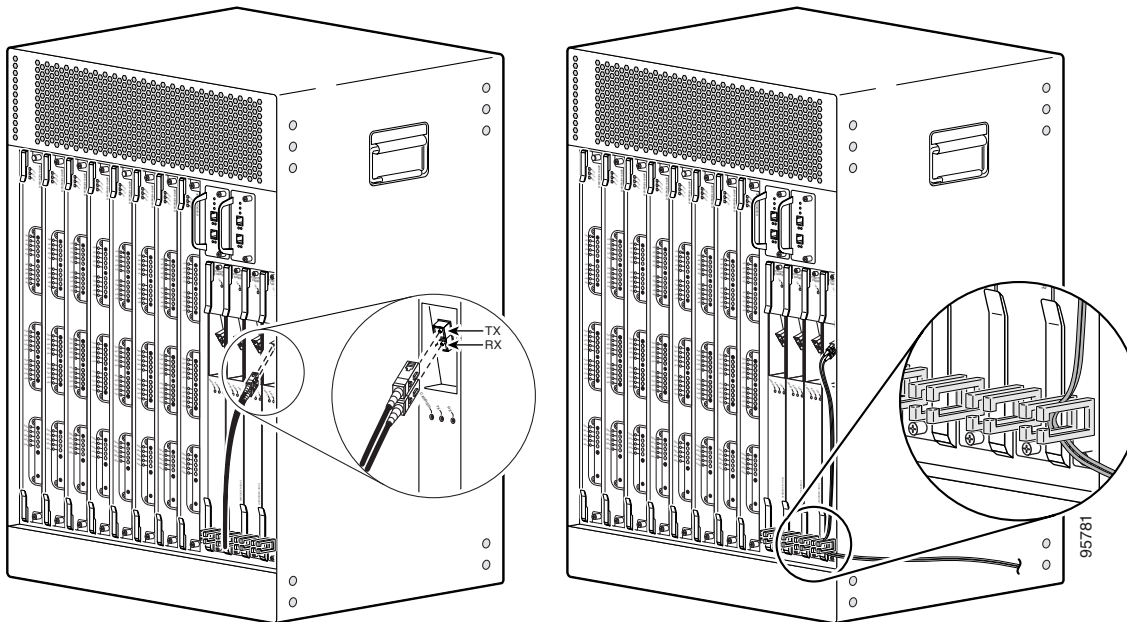
6 Power On the Cisco uBR10012 Router

After all of the interfaces and other cables are connected, perform a visual check of all connections and ensure the following:

- All captive screws on all line cards and modules are tight.
- The ejector levers on every card are in the locked position.
- All the cables are connected (power, data link, network, Ethernet).

- The console terminal or modem is cabled and turned on.
- A PCMCIA flash memory card is installed in the PRE module.

You are now ready to power on the system for the first time using the following procedure.

DC PEM

Step 1 Verify that each DC PEM is turned OFF (0). See Figure 23.

Step 2 Remove the tape from the circuit breaker switch handle.

Step 3 Turn on power at the power supply that is suppling the DC power for the chassis.

✎

Note If you are using the 2400-W AC-input power shelf, this step requires plugging the three AC power cords into the back of the unit and into the outlets providing the AC power source. The AC OK and DC OK LEDs on the AC-input power shelf should both come on, indicating that both AC input and DC output power is present.

Step 4 After turning on the DC power source, verify that the FAULT LED on each PEM comes on (yellow), indicating that the PEM is receiving power from the DC power source but is not yet supplying power to the chassis (because its power switch is off). If the Fault LED does not come on,

a. Turn off the DC power source.

b. Verify that the wiring from the DC power source to the two terminal blocks underneath each DC PEM is correct, as described in the "Connecting –48/–60 VDC Power to the Cisco uBR10012 Router" section on page 18.

🔍

Tip If the miswire LED comes on for either PEM, it indicates that the two wires from the DC source (–48/–60 VDC and RTN) were reversed when connected. Turn off the DC power source and reverse the two wires so that the –48/–60 VDC lead is connected to the bottom terminal and the RTN lead is connected to the top terminal.

Step 5 Turn the power switch on each DC PEM to the ON (|) position.

Figure 23   Cisco uBR10012 Router DC and AC PEM Power Switches

DC power switch in ON position   AC power switch in ON position
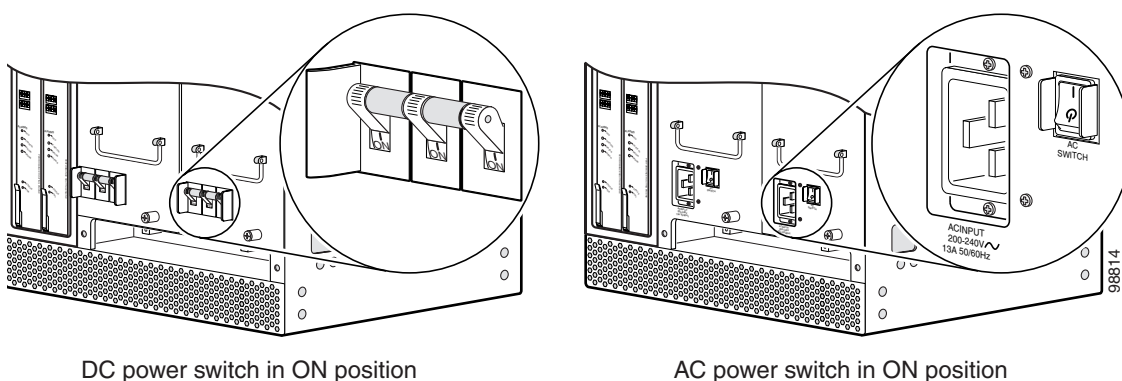
Step 6 Verify that all LEDs are coming on properly:

a. The Power LED on each PEM is on (green), indicating that power is being received and is being delivered to the chassis.

If the other LEDs on the PEM (Miswire or Fault) come on (yellow), see the "Troubleshooting" section on page 35.

b. Listen to the fans as power is applied. When you first apply power to the chassis, the fans in the fan assembly module initially operate at high speed. If all four fans are operating correctly, and if the temperature of the chassis is in the nominal operating range, the fans slow down to their normal operating speed.

c. The OK LED on the fan assembly module is on (green), indicating that all fans in the blower are operating properly. You should be able to feel air being taken in at the bottom front of the chassis and being blown out at the top rear of the chassis.

    d. If either the Single Fan Failure LED or the Multiple Fan Failure LED comes on (yellow), see the "Troubleshooting" section on page 35.

    e. The Fail LED on each PRE module comes on (yellow) briefly during the power-on sequence, but then should turn off.

       If the Fail LED does not go off on either PRE, verify that the ejector levers are fully closed and that the captive screws have been tightened. If necessary, remove the PRE from the chassis and reinsert it or replace it.

When the power-on sequence is complete, the PRE begins to initialize the line cards. Continue with the next section, "Configuring the Cisco uBR10012 Router at Startup," to configure the line cards.

AC PEM

Step 1 Remove any tape and move the power switch on the AC PEMs to the on position. See Figure 23 on page 29.

Step 2 Go to Step 6 in the DC PEM section.

7 Configuring the Cisco uBR10012 Router at Startup

This section explains how to create a basic running configuration for your Cisco uBR10012 router using the Cisco uBR10012 router setup facility or the Cisco IOS command-line interface (CLI).

PC Console or Terminal Default Settings

To configure a Cisco uBR10012 router from the console, you must connect a terminal or terminal server to the router's console port. The terminal emulation software or the terminal should have the following default settings:

- 9600 baud
- 8 data bits
- 1 stop bit
- No parity
- No flow control

Example Startup Display

When you power on your Cisco uBR10012 router or execute the reload command, the console screen displays a message similar to the following:

```
Restricted Rights Legend
Use, duplication, or disclosure by the Government is
subject to restrictions as set forth in subparagraph
(c) of the Commercial Computer Software - Restricted
Rights clause at FAR sec. 52.227-19 and subparagraph
(c) (1) (ii) of the Rights in Technical Data and Computer
Software clause at DFARS sec. 252.227-7013.

        cisco Systems, Inc.
        170 West Tasman Drive
        San Jose, California 95134-1706

Cisco Internetwork Operating System Software
IOS (tm) 10012 Software (UBR10K-P6-M), Released Version 12.2(1)
Copyright (c) 1986-2001 by cisco Systems, Inc.
Compiled Thu 19-Apr-01 13:47 by samants
Image text-base: 0x60008960, data-base: 0x612B0000
```

```
ROM: System Bootstrap, Version 12.0(9r)SL1, RELEASE SOFTWARE (fc1)
BOOTFLASH: 10012 Software (C10K-EBOOT-M), Released Version 12.1(5)

System returned to ROM by reload at 12:59:35 PDT Thu Apr 19 2001
System restarted at 13:00:51 PDT Thu Apr 19 2001


cisco C10012 (PRE-RP) processor with 98304K/32768K bytes of memory.
Processor board ID ABCDEFEDCBA
R7000 CPU at 262Mhz, Implementation 39, Rev 2.1, 256KB L2, 2048KB L3 Cache
Backplane version 1.0, 16 slot

Last reset from unexpected value
Toaster processor tmc0 is running.
Toaster processor tmc1 is running.
1 Ethernet/IEEE 802.3 interface(s)
1 FastEthernet/IEEE 802.3 interface(s)
1 Gigabit Ethernet/IEEE 802.3 interface(s)
3 Cable Modem network interface(s)
509K bytes of non-volatile configuration memory.

16384K bytes of Flash PCMCIA card at slot 1 (Sector size 128KB).
32768K bytes of Flash internal SIMM (Sector size 256KB).
Press RETURN to get started!
```

Basic Configuration Using the Setup Facility

The first time you power on a Cisco uBR10012 router, the setup facility starts. You can also initiate the facility by running the **setup** command in privileged EXEC mode. This facility helps you enhance a default configuration that already exists on the Cisco uBR10012 router. The setup facility uses a question and answer sequence called the System Configuration Dialog to walk you through configuring the router.

You do not have to configure the interfaces immediately; however, you cannot enable the interfaces or connect them to any networks until you have configured them.

Tip　Basic configuration setup is often used as a quick way to achieve network connectivity, allowing you to retrieve a configuration file from a TFTP server.

System Configuration Dialog

Use the System Configuration Dialog to help you perform a basic configuration. Proceed through the dialog by answering questions and then pressing the **Enter** key. In most cases, you can get additional information by entering a question mark (?). Throughout the dialog, default values are shown in square brackets [ ].

Tip　If you have experience using Cisco routers, consider configuring the router by using the procedure described in the "Basic Configuration in Global Configuration Mode" section.

To cancel the configuration dialog, press **Ctrl-C,** or you can let the dialog help you perform one of two configuration types:

- Basic configuration setup configures only enough connectivity for management of the system.
- Extended setup asks you to configure each interface and is not appropriate for configuring the Cisco uBR10012 router. For configuration information, see the *Cisco CMTS Configuration Commands* at the following URL:

  http://www.cisco.com/univercd/cc/td/doc/product/cable/bbccmref/bbcmtscf.htm

You can run the setup facility any time you are at the enable prompt (#) by entering the command **setup**.

Configuring the System Using System Configuration Dialog

To perform a basic configuration using the System Configuration Dialog, follow this procedure:

Step 1 The dialog starts by asking if you want to continue with the configuration dialog. Enter **Yes**. To return to the enable prompt, enter **No**.

```
--- System Configuration Dialog ---
Continue with configuration dialog? [yes/no]: yes
```

Step 2 Enter **Yes** to perform a basic management setup. Enter **No** to perform an extended configuration setup.

```
Would you like to enter basic management setup? [yes/no]: yes
```

Step 3 Specify a host name. The host name becomes part of the IOS prompt.

```
Enter host name [Router]: my-router
```

Step 4 Specify a secret password. It appears in encrypted form in the configuration file.

```
Enter enable secret: my_secret
```

Step 5 Specify the enable password. It is used if you did not assign a secret one.

```
Enter enable password: my_password
```

Step 6 Specify the password to use for Telnet sessions.

```
Enter virtual terminal password: my_vt
```

Step 7 At the *Configure System Management* prompt, enter **No**.

```
Configure System Management? [yes/no]: no
```

Step 8 If you want to access the router using SNMP, enter **Yes** at the prompt:

```
Configure SNMP Network Management? [yes]: yes
```

Step 9 Specify an SNMP community string.

```
Community string [public]: public
```

Setting up the Interface

After you respond to the SNMP questions, the setup script lists the interfaces. The following table lists typical interfaces found on a Cisco uBR10012 router.

Interface	IP-Address	OK?	Method	Status	Protocol
Ethernet0/0/0	unassigned	Yes	uset	up	up
FastEthernet0/0/0	unassigned	No	uset	up	up
GigabitEthernet3/0/0	unassigned	No	uset	up	up
Cable6/1/0	unassigned	No	uset	up	up
Cable6/1/1	unassigned	No	uset	up	up
Cable7/0/0	unassigned	No	uset	up	up

Tip Interfaces that are not okay (No) have an invalid configuration or are not configured.

Step 1 To achieve network connectivity, enter the interface for the Fast Ethernet interface.

```
Enter interface name used to connect to the management network from the above interface summary:
FastEthernet0/0/0
```

Step 2 Accept the default value for the type of connector. RJ-45 is the only connector that can be used on the Cisco uBR10012 router Ethernet port.

```
Configuring interface FastEthernet0/0/0:
Use the 100 Base-TX (RJ-45) connector? [yes]: yes
```

Step 3 Configure both the Cisco uBR10012 router and the remote device to use the same mode.

```
Operate in full-duplex mode? [no]: no
```

Step 4 You must enter the IP address to achieve network connectivity.

```
Configure IP on this interface? [yes]: yes
```

Step 5 Specify the IP address.

```
IP address for this interface: 172.27.48.209
```

Step 6 Enter the subnet mask for the IP address.

```
Subnet mask for this interface [255.255.0.0] : 255.255.0.0
```

The system displays the information you entered as well as several default commands, such as the **no shutdown** command. For example:

```
The following configuration command script was created:
hostname c10012
enable secret 5 $$1$uror$EFU0hKOBQXhk975qKFZlL0
enable password <xxx>
line vty 0 4
password <xxx>
no snmp-server
!
no ip routing
!
interface FastEthernet0/0/0
no shutdown
media-type 100BaseX
half-duplex
ip address 172.27.48.209 255.255.0.0
!
end
```

Step 7 The setup script concludes by giving you the choice to exit without saving, to start the setup script, or to save the configuration file:

```
[0] Go to the IOS command prompt without saving this config.
[1] Return back to the setup without saving this config.
[2] Save this configuration to nvram and exit.

Enter your selection [2]:
```

Step 8 After you complete the configuration dialog, enter global configuration mode and enable ip routing by entering the **ip routing** command:

```
router(config)# ip routing
```

Basic Configuration in Global Configuration Mode

The following command sequence allows you to perform a configuration similar to that generated by the **setup** command:

```
Router> configure terminal
Router(config)# hostname c10012
Router(config)# enable secret <my_router>
Router(config)# enable password <my_rtr>
Router(config)# snmp-server community public
Router(config)# ip routing
Router(config)# interface FastEthernet0/0/0
Router(config-if)# no shutdown
Router(config-if)# media-type 100BaseX
Router(config-if)# half-duplex
Router(config-if)# ip address 192 255.255.0.0
Router# copy running-config startup-config
```

You can now configure the line cards. For specific information on system and interface configuration, refer to the *Cisco uBR10012Universal Broadband Router Software Configuration Guide* at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ubr10012/scg/index.htm

Formatting Flash Memory Cards and Disks

The flash memory disk card that shipped with your router contains the default Cisco IOS image for booting your router. This section explains how to format a flash memory disk.

⚠️

Caution The formatting procedure erases all information on the flash memory disks or cards.

✎

Note The Cisco uBR10012 router uses 48 MB or 128 MB PCMCIA memory cards.

Flash memory disks and flash memory cards use similar commands. The primary syntax change is that disk0: or disk1: refers to flash memory disks while slot0: or slot1: refers to flash memory cards.

To format a flash memory disk, follow this procedure:

Step 1 Ensure that there is a flash memory disk in PCMCIA slot 0 or slot 1 of the PRE.

Step 2 Enter the **format diskn:** command at the privileged EXEC mode prompt to format the disk.

The following example shows the display after you enter the **format disk0:** command:

```
Router# format disk0:

All sectors will be erased, proceed? [confirm]
Enter volume id (up to 30 characters): MyNewdisk
Formatting sector 1
Format device slot0 completed
Router#
```

The flash memory disk is ready for use.

8 Troubleshooting

The following section provides troubleshooting tips and procedures that you can use to verify your system setup.

Before You Call for Technical Assistance

If you are unable to solve the problem easily, contact a Cisco customer service representative for assistance and further instructions. See the "Obtaining Technical Assistance" section on page 41. Provide the representative with the following information:

- Date you received the router
- Chassis serial number
- Type of software and release number
- Brief description of the problem you are having
- Brief explanation of the steps you have taken to isolate and resolve the problem
- Maintenance agreement or warranty information

Normal Startup Sequence

When you start up the router for the first time, observe the startup sequence described in the "Power On the Cisco uBR10012 Router" section on page 28.

The LEDs indicate all system states in the startup sequence. By checking the state of the LEDs, you can determine when and where the system failed in the startup sequence.

When you start up the system by turning the power supply switch to the ON (I) position, the following should occur:

1. Fans—the fans start operating. The FANS OK LED on the fan assembly module comes on (green).

2. DC PEM—the POWER LED on each DC PEM comes on green to indicate that the PEM is connected to an active DC power source and is supplying power to the chassis.

   AC PEM—the POWER LED on each AC PEM comes on green to indicate that the PEM is connected to an active AC power source and is supplying power to the chassis

3. TCC+ card—the POWER LED comes on (green), the STATUS LED comes on yellow then turns green (active) or blinking green (backup). PRESENT LED comes on (green).

4. PREs—the FAIL LEDs on the PRE modules briefly come on during the power-on sequence and then go off and the STATUS LEDs comes on green.

   Note The slot 0 and slot 1 LEDs on the PRE comes on only when the PCMCIA card slots are being accessed by the system. These LEDs remain off during normal operation of the router and do not indicate startup problems.

5. Line cards/adapter cards and uplink cards—ENABLED LEDs turn green and then goes off.

   Note Each line card has an ENABLED LED that comes on initially at power-on and then goes off. The LED then comes on and remains on when the corresponding port is enabled and configured for operations.

6. The initial system banner appears on the console screen.

Solving Startup Problems by Using a Subsystems Approach

Because a startup problem is usually caused by a single component, it is more efficient to isolate the problem to a subsystem rather than troubleshoot each component in the system. For these troubleshooting procedures, consider the following subsystems:

- Power subsystem—Includes the power supplies (DC PEMs or AC PEMs) and the external power cables
- Processor subsystem—Includes the PRE processor card and TCC+ card
- Cooling subsystem—Includes the fan assembly
- Card subsystem—Includes the cable interface cards and uplink cards, and cabling

Troubleshooting Tips

For more information, refer to the troubleshooting section of the *Cisco uBR10012 Hardware Installation Guide* at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ubr10012/hig/u10ktrb.htm

You can use the **show environment** command to display the general health of the power system. For additional tips, see Table 5.

```
Router# show environment
Temperature normal: chassis inlet measured at 29C/84F
Temperature normal: chassis core measured at 42C/107F
Fan:                                   OK
Power Entry Module 0 type DC status:         OK
Power Entry Module 1 type DC status:         OK
Router#
```

Table 5   *Troubleshooting Tips*

Symptom	Action
System fails to power on	Check that all the power cords are properly connected to the router and at the power source. 1. The DC PEM power switches are turned on and the POWER LED is on (green). 2. The AC PEM power switches are turned on and the POWER LED is on (green). 3. The fan module is fully inserted, and the FANS OK LED is on (green).
System fails to boot up properly	If the system has power, check the FAIL LED on the PRE and any information on the alphanumeric display.
You cannot establish a console or Telnet connection to the system.	1. Verify that you have the correct cable (cross connect). 2. Verify that the Ethernet cable is connected to the correct port on the PRE and the hub. 3. Make sure that the PRE has booted properly.

Ethernet port is not configured properly.	If you have a working console connection, perform the following steps:
	 1. At the router prompt, enter **show int fast0/0/0**. If the port is administratively down, enter these commands to enable it:
	
	 `switch>` **configure terminal**
	 `Enter configuration commands, one per line. End with CNTL/Z.`
	 `router(config-if)#` **int fast0/0/0**
	 `router(config-if)#` **no shut**
	 `router(config-if)#` **exit**
	 `router(config)#` **exit**
	 `router#`
	
	 2. Check that the Ethernet port in question has a valid IP address assigned to it.

Table 5 *Troubleshooting Tips (continued)*

Symptom	Action
DC PEM FAULT LED or MISWIRE LED is on.	If the FAULT LED is on, check the power source, and verify that the PEM is properly installed.
	If the MISWIRE LED is on, the –48/–60 VDC and return (RTN+) wires are reversed. Power off the PEM, remove it from the chassis, and reconnect the wires correctly.
AC PEM POWER or FAULT LED is on.	If the POWER LED on the AC PEM is off, check the AC power source.
	If the FAULT LED is yellow, check to see if the PEM is properly inserted in the chassis. Check the Cisco IOS release version that you are using. Releases earlier than Cisco IOS release 12.2(4)XFI, 12.2(4)BC1 do not correctly identify the AC PEM's error messages.
PRE alarms–Critical, Minor, or Major LED on the PRE is on	Enter the **show facility -alarm status** command at the console to identify the problem.
Fans do not come on at startup.	1. Verify that the system has power.
	2. Remove the fan assembly module, check the fan cables, and reinsert the module.
Fan alarm LEDs come on.	If the Single Fan Failure LED is on, one fan of the four has failed, but the system is still able to adequately cool the chassis. The fan assembly module must be repaired or replaced as soon as possible.
	If the Multiple Fan Failure LED is on, more than one fan has failed, and the fan assembly module is no longer able to adequately cool the Cisco uBR10012 chassis. Replace the fan assembly module immediately

System overheats.
 	
Tip When the fans are operating, you can hear them. You can also feel air being drawn in at the bottom front and expelled at the top rear of the chassis.
	This may be due to a failure in the fan assembly module, insufficient ventilation, or high ambient temperature. Use the **show environment** command to verify.
	
	```Router# show environment```
	
	```Temperature normal: chassis inlet measured at 29C/84F```
	```Temperature normal: chassis core measured at 42C/107F```
	```Fan: OK```
	```Power Entry Module 0 type DC status: OK```
	```Power Entry Module 1 type DC status: OK```
	```Router#```

STATUS LED on the primary PRE did not come on (solid green) at the end of the boot-up sequence?	Check the other LEDs on other modules in the chassis. If no other LEDs are on, check for a problem in the power subsystem.
If no LEDs on the PRE are on but LEDs on other modules are on.	Remove the PRE from the slot, check for any bent or broken pins on the backplane connectors, and reinsert the PRE, ensuring that it makes solid contact with the backplane and is securely locked in by firmly closing both locking levers.
The FAIL LED on the PRE is lit (yellow).	Remove the PRE and reinsert it. If that fails, insert a new PRE. Repeat the process for the redundant PRE, except that its STATUS LED should be off and its alphanumeric display should read IOS STBY if it is operating correctly.
	1. If both PREs are operating correctly, check the Power LEDs on each TCC+ card. Are they both on (green)?
	a. Is the STATUS LED on the primary TCC+ on (solid green) indicating that it is the primary card?
	b. Is the STATUS LED on the secondary TCC+ flashing (green) indicating that it is the redundant card?
	c. If no, verify that the release of Cisco IOS software on the router supports the TCC+ card.
The STATUS lights on the TCC+ are off.	Remove the TCC+ card and reinsert it, making sure that it firmly connects to the backplane and that both captive screws are tightly connected.

Table 5   Troubleshooting Tips (continued)

Symptom	Action
ENABLED LED on the line cards or on the uplink cards does not go on.	1. If the ENABLED LED is off, first verify that the card has been enabled and ENABLED LED remains off when a card has not been configured and enabled.
	2. If a port has been enabled but its corresponding ENABLED LED is still off, reseat the card in its slot (you do not have to turn off the system power when removing or replacing the card). After the system re initializes the interfaces, the ENABLED LED on the card should go on.
	3. If the ENABLED LED remains off after the above checks, it is likely that the system has detected a processor hardware failure. See the "Obtaining Technical Assistance" section on page 41.
FAIL (yellow) on the HHGE—This LED lights during portions of the POST (Power-On Self Test), but remains off after the POST on a properly working HHGE. If it fails during operation, this LED lights and an alarm event occurs.	FAIL LED blinks during the following SFP faults: • Non-Cisco SFP GBIC inserted • Non-Gigabit-Ethernet SFP GBIC is inserted • Hardware problem with a valid SFP GBIC
FAIL LED does not light during portions of the POST	The HHGE is not properly seated in the slot splitter.

Using CLI Commands to Troubleshoot

For more information about error messages and troubleshooting commands, refer to the following:

- *Cisco CMTS Debugging Commands* at the following URL:

   http://www.cisco.com/univercd/cc/td/doc/product/cable/bbccmref/bbcmtsde.htm

- *Cisco CMTS Error Messages* at the following URL:

   http://www.cisco.com/univercd/cc/td/doc/product/cable/cab_rout/ubrerrs.htm

- *Cisco uBR10012 Universal Broadband Router Software Configuration Guide* at the following URL:

   http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ubr10012/scg/index.htm

- *Cisco Broadband Cable Command Reference Guide* at the following URL:

   http://www.cisco.com/univercd/cc/td/doc/product/cable/bbccmref/index.htm

9 Related Documentation

Chassis Installation Documentation

Cisco uBR10012 Universal Broadband Hardware Installation Guide at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ubr10012/hig/index.htm

FRU Documentation

For documentation about the different modules used with the Cisco uBR10012 router, go to the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ubr10012/frus/index.htm

Cabling Information

Cabling the Cisco uBR-MC5X20S/U/H Cable Interface Line Card with UCH1 Quick Start Guide at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ubr10012/qsg/mc52_cbl.pdf

Cabling the Cisco uBR-MC5X20S/U/H Cable Interface Line Card Quick Start Guide with UCH2 at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ubr10012/qsg/mc52_cb2.pdf

Cabling the Cisco RF Switch with the Cisco uBR10012 CMTS at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/rfswitch/rfsw10kc.htm

Cable Specifications

http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ubr10012/hig/u10kcbl.htm

Frequency Allocation Tables

http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ubr10012/hig/u10kfrq.htm

Regulatory Compliance and Safety Information

http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ub10rcsi.htm

Inspection and Cleaning Procedures for Fiber-Optic Connections

http://www.cisco.com/warp/public/127/cleanfiber2.html

10 Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain technical assistance and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

You can access the most current Cisco documentation at this URL:

http://www.cisco.com/techsupport

You can access the Cisco website at this URL:

http://www.cisco.com

You can access international Cisco websites at this URL:

http://www.cisco.com/public/countries_languages.shtml

Product Documentation DVD

Cisco documentation and additional literature are available in the Product Documentation DVD package, which may have shipped with your product. The Product Documentation DVD is updated regularly and may be more current than printed documentation.

The Product Documentation DVD is a comprehensive library of technical product documentation on portable media. The DVD enables you to access multiple versions of hardware and software installation, configuration, and command guides for Cisco products and to view technical documentation in HTML. With the DVD, you have access to the same documentation that is found on the Cisco website without being connected to the Internet. Certain products also have .pdf versions of the documentation available.

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Cisco Ordering tool:

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Cisco Marketplace:

http://www.cisco.com/go/marketplace/

Ordering Documentation

Beginning June 30, 2005, registered Cisco.com users may order Cisco documentation at the Product Documentation Store in the Cisco Marketplace at this URL:

http://www.cisco.com/go/marketplace/

Cisco will continue to support documentation orders using the Ordering tool:

- Registered Cisco.com users (Cisco direct customers) can order documentation from the Ordering tool:

  http://www.cisco.com/en/US/partner/ordering/

- Instructions for ordering documentation using the Ordering tool are at this URL:

  http://www.cisco.com/univercd/cc/td/doc/es_inpck/pdi.htm

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, USA) at 408 526-7208 or, elsewhere in North America, by calling 1 800 553-NETS (6387).

11 Documentation Feedback

You can rate and provide feedback about Cisco technical documents by completing the online feedback form that appears with the technical documents on Cisco.com.

You can send comments about Cisco documentation to bug-doc@cisco.com.

You can submit comments by using the response card (if present) behind the front cover of your document or by writing to the following address:

Cisco Systems
Attn: Customer Document Ordering
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

12 Cisco Product Security Overview

Cisco provides a free online Security Vulnerability Policy portal at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

From this site, you can perform these tasks:

- Report security vulnerabilities in Cisco products.
- Obtain assistance with security incidents that involve Cisco products.
- Register to receive security information from Cisco.

A current list of security advisories and notices for Cisco products is available at this URL:

http://www.cisco.com/go/psirt

If you prefer to see advisories and notices as they are updated in real time, you can access a Product Security Incident Response Team Really Simple Syndication (PSIRT RSS) feed from this URL:

http://www.cisco.com/en/US/products/products_psirt_rss_feed.html

Reporting Security Problems in Cisco Products

Cisco is committed to delivering secure products. We test our products internally before we release them, and we strive to correct all vulnerabilities quickly. If you think that you might have identified a vulnerability in a Cisco product, contact PSIRT:

- Emergencies—security-alert@cisco.com

  An emergency is either a condition in which a system is under active attack or a condition for which a severe and urgent security vulnerability should be reported. All other conditions are considered nonemergencies.

- Nonemergencies—psirt@cisco.com

In an emergency, you can also reach PSIRT by telephone:

- 1 877 228-7302
- 1 408 525-6532

Tip   We encourage you to use Pretty Good Privacy (PGP) or a compatible product to encrypt any sensitive information that you send to Cisco. PSIRT can work from encrypted information that is compatible with PGP versions 2.x through 8.x.

Never use a revoked or an expired encryption key. The correct public key to use in your correspondence with PSIRT is the one linked in the Contact Summary section of the Security Vulnerability Policy page at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.htm

The link on this page has the current PGP key ID in use.

13   Obtaining Technical Assistance

Cisco Technical Support provides 24-hour-a-day award-winning technical assistance. The Cisco Technical Support & Documentation website on Cisco.com features extensive online support resources. In addition, if you have a valid Cisco service contract, Cisco Technical Assistance Center (TAC) engineers provide telephone support. If you do not have a valid Cisco service contract, contact your reseller.

Cisco Technical Support & Documentation Website

The Cisco Technical Support & Documentation website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The website is available 24 hours a day, at this URL:

http://www.cisco.com/techsupport

Access to all tools on the Cisco Technical Support & Documentation website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

http://tools.cisco.com/RPF/register/register.do

> **Note** Use the Cisco Product Identification (CPI) tool to locate your product serial number before submitting a web or phone request for service. You can access the CPI tool from the Cisco Technical Support & Documentation website by clicking the **Tools & Resources** link under Documentation & Tools. Choose **Cisco Product Identification Tool** from the Alphabetical Index drop-down list, or click the **Cisco Product Identification Tool** link under Alerts & RMAs. The CPI tool offers three search options: by product ID or model name; by tree view; or for certain products, by copying and pasting **show** command output. Search results show an illustration of your product with the serial number label location highlighted. Locate the serial number label on your product and record the information before placing a service call.

Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool provides recommended solutions. If your issue is not resolved using the recommended resources, your service request is assigned to a Cisco engineer. The TAC Service Request Tool is located at this URL:

http://www.cisco.com/techsupport/servicerequest

For S1 or S2 service requests or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)
EMEA: +32 2 704 55 55
USA: 1 800 553-2447

For a complete list of Cisco TAC contacts, go to this URL:

http://www.cisco.com/techsupport/contacts

Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

Severity 1 (S1)—Your network is "down," or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Severity 3 (S3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

14 Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- Cisco Marketplace provides a variety of Cisco books, reference guides, documentation, and logo merchandise. Visit Cisco Marketplace, the company store, at this URL:

  http://www.cisco.com/go/marketplace/

- *Cisco Press* publishes a wide range of general networking, training and certification titles. Both new and experienced users will benefit from these publications. For current Cisco Press titles and other information, go to Cisco Press at this URL:

  http://www.ciscopress.com

- *Packet* magazine is the Cisco Systems technical user magazine for maximizing Internet and networking investments. Each quarter, Packet delivers coverage of the latest industry trends, technology breakthroughs, and Cisco products and solutions, as well as network deployment and troubleshooting tips, configuration examples, customer case studies, certification and training information, and links to scores of in-depth online resources. You can access Packet magazine at this URL:

  http://www.cisco.com/packet

- *iQ Magazine* is the quarterly publication from Cisco Systems designed to help growing companies learn how they can use technology to increase revenue, streamline their business, and expand services. The publication identifies the challenges facing these companies and the technologies to help solve them, using real-world case studies and business strategies to help readers make sound technology investment decisions. You can access iQ Magazine at this URL:

  http://www.cisco.com/go/iqmagazine

  or view the digital edition at this URL:

  http://ciscoiq.texterity.com/ciscoiq/sample/

- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:

  http://www.cisco.com/ipj

- Networking products offered by Cisco Systems, as well as customer support services, can be obtained at this URL:

  http://www.cisco.com/en/US/products/index.html

- Networking Professionals Connection is an interactive website for networking professionals to share questions, suggestions, and information about networking products and technologies with Cisco experts and other networking professionals. Join a discussion at this URL:

  http://www.cisco.com/discuss/networking

- World-class networking training is available from Cisco. You can view current offerings at this URL:

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Corporate Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
         800 553-NETS (6387)
Fax: 408 526-4100

European Headquarters
Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: 31 0 20 357 1000
Fax: 31 0 20 357 1100

Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-7660
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Asia Pacific Headquarters
Cisco Systems, Inc.
168 Robinson Road
#28-01 Capital Tower
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Tel: +65 6317 7777
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